State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Northern District

# FINAL
# ENVIRONMENTAL IMPACT REPORT
## ON THE REVOCATION OF THE CERTIFICATE OF APPROVAL FOR
# MISSELBECK DAM AND RESERVOIR

December 1990

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| Gordon K. Van Vleck | George Deukmejian | David N. Kennedy |
| Secretary for Resources | Governor | Director |
| The Resources Agency | State of California | Department of Water Resources |

## PREFACE

Certification and approval of the Final Environmental Impact Report, completed in April 1990, were delayed until a cooperative stability investigation of the embankment at Misselbeck Dam could be completed. The investigation, completed in July 1990, was reviewed by the Division of Safety of Dams, which concluded in September 1990 that the embankment should perform satisfactorily during the design earthquake. However, siltation at the outlet pipes and hydraulic and structural spillway deficiencies must still be corrected. An addendum, which precedes the text of the Environmental Impact Report, discusses the results of this investigation and the still existing safety deficiencies at Misselbeck Dam.

The Final Environmental Impact Report incorporates additional discussion in response to comments received on the Draft Environmental Impact Report. Changes from the Draft Environmental Impact Report are shown in italics.

The Final Environmental Impact Report includes as appendices A) the Initial Study on the revocation of the Certificate of Approval for Misselbeck Dam and Reservoir; B) the proceedings of the public hearing held at Ono on November 2, 1989 to receive comments on the Draft Environmental Impact Report; C) comments received on the Draft Environmental Impact Report; D) letters expressing concern about the effects of revocation, but not commenting on the Draft Environmental Impact Report; E) a list of persons, organizations, or public agencies commenting on the Draft Environmental Impact Report; and F) loan and grant programs available to assist with water supply issues.

This report was prepared for consideration by the Division of Safety of Dams during the process of determining whether the Certificate of Approval for Misselbeck Dam should be revoked.

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The Resources Agency
GORDON K. VAN VLECK, Secretary for Resources

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## ADDENDUM

The Final Environmental Impact Report was completed and routed for certification and approval within the Department of Water Resources in early April 1990. Prior to approval, however, a cooperative stability investigation of the embankment at Misselbeck Dam was begun by the Igo-Ono Community Services District, Northern and Central Districts of the Department of Water Resources, Centerville Community Services District, and Shasta County. Approval of the Final Environmental Impact Report was delayed pending the outcome of the stability investigation.

The Central District completed the report "Geotechnical Investigation and Stability Evaluation - Misselbeck Dam, No. 2220-2" in July 1990 (Sweigert and Senter 1990), which was critically reviewed by the Division of Safety of Dams (Gutierrez and Mihyar 1990). The previous investigation by $CH_2M$ Hill, Inc. in 1986 had provided sufficient information to confirm the concern for the condition of the hydraulic fill dam embankment, which could not be considered safe without further investigation. Results of the present cooperative investigation, however, indicate that the dam embankments are sufficiently stable to withstand the maximum credible earthquake. The Division of Safety of Dams review concluded that the embankment would perform satisfactorily during the design earthquake.

However, siltation at the outlet pipes and hydraulic and structural spillway deficiencies must still be corrected before unrestricted storage could be allowed. The Igo-Ono Community Services District has been requested to provide a plan and schedule for correcting the outlet and spillway deficiencies.

### Field Exploration

Exploratory drilling and trenching began on April 18 and was completed on April 27, 1990. Seven bore holes and four exploratory trenches were used in the investigation. Six of the holes were through the main embankment, while one hole was through the auxiliary embankment. Standard penetration tests were conducted in each hole at about 5 foot intervals. Disturbed and undisturbed samples

were obtained for laboratory testing.

Two trenches were excavated on either side of the crest of both the main and auxiliary embankments. Sand-cone density tests were conducted in the main embankment trenches to estimate the *in situ* density and moisture content of the core and upstream shell.

**Embankment Conditions**

Results of the exploration revealed that both the main and auxiliary embankments are internally zoned (Sweigert and Senter 1990). The zones identified include the core, upstream and downstream shells, upstream and downstream transitions, downstream face, and road base.

The core consists of thinly interbedded brown to grey silt, sandy silt, and silty sand, which are very loose to loose. The silt beds are thinly laminated, and the sand beds are very fine to fine grained. The upstream shell is brown to grey, loose to compact, medium to coarse grained silty sand and poorly graded sand with occasional gravel and sandy silt interbeds. The percentage of fines decreases with distance from the centerline. The downstream shell is notably more dense than the upstream shell, and is composed of slightly compact to compact, well-graded grey sand with minor reddish-brown mottling. The transition zones are areas of variable width occupied by interfingering core and shell material created during construction of the embankment. The downstream face of the embankment is covered with a 6 foot thick layer of gravelly well-graded sand, which is grey with brown mottling, loose to slightly compact, and contains subangular to angular rock fragments up to 6 inches in diameter. This material was apparently placed on the embankment after the hydraulic fill was completed to achieve a uniform downstream slope. The road base occurs as a veneer at the crest of both embankments and has an average thickness of 5 feet. The road base is brown, loose, dry to moist, medium to coarse grained silty sand, poorly graded sand, and well-graded sand.

Uncorrected blow-counts within the core increased with depth and proximity to the left abutment, ranging from less than 1 to 20 blows per foot. Blow-counts within the

shells generally increased with depth, and ranged from 6 to 48 blows per foot in the upstream shell and 19 to 69 blows per foot in the downstream shell. Uncorrected standard penetration blow-counts in the outer extents of the transition zone near the bottom of the embankment ranged from 32 to 48 blows per foot.

**Foundation Conditions**

Two foundation materials are apparent for the dam. Construction drawings show that much of the foundation for the dam was covered with native soil. The native soil and upper decomposed granodiorite were removed from the cutoff and from the keys excavated along the toe for the upstream and downstream shells. The native soil is brown, very fine to fine grained, compact, poorly graded sand and silty sand. Bedrock is brown to grey, strongly weathered to decomposed, soft and weak to moderately strong granodiorite.

The native soil and weathered granodiorite were judged to provide an adequate foundation for the embankment, and not liquefy during the design seismic loading (Sweigert and Senter 1990).

**Evaluation of Liquefaction Potential**

Liquefaction potential was analyzed for full reservoir storage and seismic shaking from a maximum credible earthquake of 7.75 on the Gorda Plate subduction zone located 33 miles from the dam, which would produce a peak bedrock acceleration of 0.24g. The core would liquefy under these conditions, while most of the shell will not loose significant strength (Gutierrez and Mihyar 1990). The shell is the critical material for stability considerations. The upper portion of the upstream shell may liquefy while the lower portion nearer the upstream toe may develop high pore pressures. However, residual strength would assure stability of the upper portions of the dam. Discounting residual strength, some shallow movement could occur, but release of the reservoir would not be likely. No pore pressures would likely develop in the downstream shell.

Minimum safety factors calculated using the computer program STABL for the

upstream and downstream slopes are 1.1 and 1.4, respectively (Gutierrez and Mihyar 1990). Generally, a factor of safety greater than one for post-earthquake stability is sufficient to consider a dam as safe. The dam is not considered to be well built from the standpoint of seismic stability, but because of the low accelerations expected and the 14 feet of available freeboard, the dam should not fail during the expected maximum credible earthquake.

**Certificate of Approval**

Based on the cooperative investigation, the Division of Safety of Dams issued a new Certificate of Approval for Misselbeck Dam in September 1990. Water may be stored to gage 50, assumed datum, which is 36 feet below the spillway crest, from October 1 to April 30, and to gage 86, which is at the spillway crest, from May 1 to September 30.

**Safety Deficiencies**

The Igo-Ono Community Services District was requested on September 14, 1990 to provide a plan and schedule by October 15, 1990 for correcting the still existing outlet pipe and spillway deficiencies. As of November 19, 1990, the Igo-Ono Community Services District has not responded.

Failure to correct the outlet pipe and spillway deficiencies could allow unsafe conditions to develop. The outlet pipes could become clogged with sediment and debris, which would eliminate any means of controlling water storage levels behind the dam, except from the spillway. Discharges through the inadequate spillway could result in overtopping of chute walls and erosion of concrete lining and backfill materials during moderate surface runoff into the reservoir. Hazards associated with failure of the dam are discussed in the Final Environmental Impact Report.

The Division of Safety of Dams, therefore, is proceeding with completion of the Final Environmental Impact Report as part of the actions that could lead to revocation of the Certificate of Approval to store water behind Misselbeck Dam.

Environmental effects from revocation of the Certificate of Approval are discussed in the Final Environmental Impact Report. The Igo-Ono Community Services District continues to have the options of complying with directives of the Division of Safety of Dams to submit plans and schedules, and undertaking actions for correcting the safety deficiencies, or removing the dam from service.

## SUMMARY

The Department of Water Resources is responsible for supervising the safety of dams in California. Misselbeck Dam in Shasta County has several structural deficiencies that create unsafe conditions for the storage of water. At least a portion of the dam embankment may be subject to failure during an earthquake. The spillway is badly deteriorated but discharges at moderate runoff levels. Reservoir sediment deposits are starting to interfere with operation of the outlet pipes. The Rainbow Water Company, which *owned and operated* the dam *prior to August 8, 1989, had* failed to comply with orders directing correctional work. The Department of Water Resources, therefore, *initiated* proceedings to revoke the Certificate of Approval issued April 29, 1981, for Misselbeck Dam and Reservoir. This action would prohibit at any time the impoundment of water behind the dam, thereby requiring that the spillway or embankment be lowered or the embankment removed. *The Igo-Ono Community Services District, which purchased the dam, must now correct the structural deficiencies to prevent revocation of the Certificate of Approval to store water.*

Prohibiting storage behind Misselbeck Dam would produce several significant effects. The loss of storage would reduce the water supply available to the *Igo-Ono Community Services District,* which serves about 70 customers in the Igo-Ono *area.* Some revenue to the water company would be lost. Though sufficient water may be available from natural streamflow in normal runoff years to meet current supply requirements, the water company may not be able to meet demands during dry years. Natural annual fluctuations in runoff would produce an undependable water supply. Sufficient water may not be available to maintain flow through the entire distribution canal, which would result in loss of recharge to some wells and loss of some riparian habitat maintained by canal leakage. Some wildlife associated with the riparian habitat would also be lost. Future growth and agricultural development would be limited. Fire suppression capabilities would be reduced. The potential for catastrophic failure of the dam embankment and subsequent mass downstream movement of fill materials and stored water and sediment would be eliminated.

The *Igo-Ono Community Services District* is responsible as a public utility for mitigating any loss of water supply. This mitigation could be done in several ways. Engineering evaluation and remedial actions may allow continued water storage behind Misselbeck Dam, either at full capacity or some reduced level. Several potential sites exist for construction of a new dam. Transportation losses of water in the distribution system could be greatly reduced by canal rehabilitation or installation of plumbing. The water supply in the Igo area could be augmented by developing a plumbed system from the Muletown Conduit of the Central Valley Project.

The objective of revocation of the Certificate of Approval is to eliminate the risk to life and property from possible dam failure. Alternatives to this action include rehabilitation of the dam to existing safety requirements, allowing limited non-jurisdictional storage which lessens, but does not eliminate, the safety hazard, or taking no action. The Department of Water Resources is directed by the Water Code to eliminate safety hazards associated with dams. Unless the *Igo-Ono Community Services District* rehabilitates Misselbeck Dam in a timely manner, the only viable alternative to eliminate hazards to life and property from possible dam failure would be to revoke the Certificate of Approval. Such action would lead to the removal of the dam or physically reducing the height or storage capacity of the dam so it would no longer fall within jurisdiction of the State.

## INTRODUCTION

Misselbeck Dam impounds water to form Rainbow Lake on the upper reach of the North Fork of Cottonwood Creek in southwestern Shasta County. Stored water is used for municipal and agricultural supplies in the communities of Igo and Ono and the surrounding area, and incidentally supports wildlife habitat.

Misselbeck Dam was constructed using hydraulic fill techniques. Such dams have shown susceptibility to severe damage from earthquakes. This, along with several other structural deficiencies, makes the dam unsafe for the storage of water. Therefore, the California Department of Water Resources, Division of Safety of Dams, has initiated proceedings for the revocation of the Certificate of Approval to store water behind Misselbeck Dam.

### Ownership

Misselbeck Dam *was* owned and operated by the Rainbow Water Company *when the Draft Environmental Impact Report was prepared. The Rainbow Water Company was* a partnership among four parties: Jack and Caroline Schreder, Norm and Andrea Warnke, Peter Fry, and Ralph and Lois Skinner. *Transfer of ownership* to the Igo-Ono Community Services District *became effective on August 8, 1989, upon approval by the California Public Utilities Commission.*

### Background

A regional water system was originally established about 1870 by the Dry Creek Tunnel and Fluming Company to provide water for mining operations. Water diverted from area creeks was transported via ditch and flume to the Happy Valley area. The water system and water rights were acquired by the Happy Valley Land and Water Company in 1907 and by the Happy Valley Irrigation District in 1917. Misselbeck Dam, Hoover Dam, and Hoover Diversion Tunnel were completed in 1920. The irrigation district became bankrupt and was dissolved in 1925, whereupon the Happy Valley Water Company was organized to continue operation of the water system. The Happy Valley Water Company changed ownership in 1965

and again in 1967, becoming the Trisdale Water Company. The water company was sold in 1984 and became known as the Rainbow Water Company. *In 1989, ownership was changed to the Igo-Ono Community Services District.*

State regulation of Misselbeck and Hoover Dams began in 1929 with the establishment of the Division of Safety of Dams in the Department of Public Works. In 1956, the Division of Safety of Dams was transferred to the Department of Water Resources. Hoover Dam was removed from State jurisdiction in 1933 when an act of the State Legislature increased the size of a reservoir subject to State jurisdiction.

Routine inspection of Misselbeck Dam by the Department on November 5, 1958 found two conditions considered to be unsafe. First, the left spillway wall had been overtopped by spillway flows, leaving that wall unsupported, partially undermined, and in danger of collapse. Several areas of the spillway channel lining had also been eroded. Second, the outlet pipes in the outlet tunnel had corroded to such an extent that failure due to internal pressure was considered possible. On December 22, 1958, the Department issued an "Order Directing Necessary Work to Be Done to Render Dam Safe and Fixing Time for Completion Thereof" to the Happy Valley Water Company. The order directed that repairs be made to the spillway by January 31, 1959 and plans be prepared for correcting deficiencies of the outlet pipe (DWR, 1958). The area behind the spillway wall was backfilled with uncompacted decomposed granite and the channel lining patched with concrete. The Happy Valley Water Company cited lack of sufficient funds to proceed immediately with plans to repair the outlet pipes. The upstream control valves for the outlet pipes were moved to the bulkhead at the upstream end of the outlet tunnel in November 1960. Gunite was placed around the pipeline between the cement bulkhead and control valves in November 1962. No repairs were made to the outlet pipes, which began to spurt water by January 1964 from holes formed by corrosion.

The Department issued another "Order Directing Necessary Work to Be Done to Render Dam Safe and Fixing Time for Completion Thereof" on May 14, 1964. The Happy Valley Water Company was directed to correct the deficiencies of the outlet pipes by November 1, 1964 and the spillway, buckled gunite lining on the upstream face of the dam, and the unprotected downstream face by November 1, 1965. The

only alternative was to drain the reservoir and remove the dam from service by November 1, 1964 (DWR, 1964a). Water users in the Happy Valley service area near Olinda requested on June 25, 1964 a delay for correction of the dam deficiencies until the Clear Creek South Unit of the Central Valley Project was completed. The Clear Creek South Unit would provide water from Whiskeytown Reservoir to the Happy Valley service area (Division 3) around Olinda, but would not provide water to the Ono (Division 1) and Igo (Division 2) areas. Water stored in the reservoir was more critical to Division 3 than Divisions 1 and 2 at this time. The Happy Valley Water Company elected to remove the dam and filed an "Application for Approval of Plans and Specifications for the Removal of a Dam" on July 28, 1964 (DWR, 1964b). However, the Department and Happy Valley Water Company mutually agreed on August 20, 1964 to extend the date for compliance with the order to June 1, 1966. This allowed continued water service from the reservoir to the Happy Valley service area until the Clear Creek South Unit of the Central Valley Project was completed (DWR, 1964c).

The Happy Valley Water Company, which changed ownership on January 1, 1965, requested on May 26, 1966 that the application for removal of the dam be withdrawn. The Department on June 16, 1966 agreed to withdraw the application and requested the owner to file a repair application. On December 14, the Department issued a new Certificate of Approval that limited storage to gauge 40, which is 46 feet below the spillway crest. The reduced storage was ordered to lessen the hazard associated with the deficient outlet pipes and operation of the spillway, which could not contain expected floodflows due to poor alignment and limited capacity.

The Happy Valley Water Company, upon sale on September 6, 1967, became the Trisdale Water Company. Approval was granted on March 7, 1969 for temporary storage to gauge 80 between April 1 and September 1, 1969 to facilitate debris removal. After September 1, storage was to be no higher than gauge 40. At the owner's request, temporary storage to gauge 76 was permitted from June 1 to August 1, 1971, with drawdown to gauge 40 by September 1.

An earthquake on February 9, 1971 caused serious damage to the Upper and Lower

San Fernando Dams, which were hydraulic fill structures in Los Angeles County. As a result, all owners of hydraulic fill dams in California were directed by the Department to conduct engineering investigations to determine the seismic stability of their dams. A December 23, 1971 order for seismic evaluations of Misselbeck Dam specified a completion date of December 1, 1973 (DWR, 1971).

One of the two corroded outlet pipes at Misselbeck Dam was replaced during November 1972 by the water company.

The Trisdale Water Company requested an increase in allowable storage to provide sufficient water for the irrigation season in the summer of 1973. On April 18, 1973, temporary storage was granted to gauge 70 between May 7 and August 10, with drawdown to gauge 40 by September 1.

The seismic evaluation of the dam was not completed by the due date. The Trisdale Water Company chose instead to operate the dam with continued substantial restriction of storage rather than complete the seismic evaluation. During June and July 1974, the company replaced the second outlet pipe.

Between 1974 and 1984, requests for temporary increases in storage during the irrigation season were received from the Trisdale Water Company and approved by the Department for storage up to gauge 59 in 1975, 1976, and 1977, and gauge 60 in 1981. A new Certificate of Approval was issued in 1981 to reflect the approved storage operations. The Department considered that winter storage at gauge 40 provided adequate protection against damage that could result from unrepaired dam deficiencies.

On April 24, 1984, the Department was notified by letter from Jack Schreder that the Trisdale Water Company would be purchased by his partnership and would be known as the Rainbow Water Company. Mr. Schreder asked for permission to store water to gauge 80. This level was approved by the Department to begin upon completion of the purchase and continue to October 1, upon which date the storage was to be no greater than gauge 40. Mr. Schreder was advised by the Department on May 2, 1984 that the seismic stability of the dam and the adequacy of the spillway

must be investigated and that remedial work may be required (DWR, 1984a). A suggested program for evaluation was included.

A request to permanently raise the reservoir to gauge 80 during the summer was made by the Rainbow Water Company on January 8, 1985. The request was denied on February 22 because the company had taken no action to address any of the deficiencies of the dam. The water company was further directed to complete studies for spillway modification by March 1, 1986; modify the inlets to the outlet pipes by June 1986 to prevent plugging by silt stored in the reservoir, which had reached the top of the intake pipe risers; and complete the seismic stability analyses as well as any necessary remedial work before increased storage could be authorized (DWR, 1985). On April 15, 1985, the company agreed to conduct an exploration program that would include drilling and sampling of the dam embankment and foundation. The work was to be completed by September 30, 1985. The Department agreed on April 15, 1985 to allow storage during the summer of 1985 to gauge 80. Operation at that level would provide the water revenues that the water company owner said were needed to fund the exploration program.

The engineering firm of $CH_2M$ Hill, Inc. in Redding, California, was hired by the Rainbow Water Company to drill one exploratory hole for geotechnical evaluation of Misselbeck Dam. *The Rainbow Water Company* was informed by telephone and letter from the Department on February 14, 1986 that the one-hole exploration program was a starting point, but does not satisfy *the* commitment for a geotechnical evaluation proposed in *the company's* April 25, 1985 letter. Drilling and sampling was conducted on March 17 and 18, 1986 by $CH_2M$ Hill, Inc. Their report, completed on April 15, 1986 ($CH_2M$ Hill, 1986), stated that the "exploration and analysis do not constitute a complete safety evaluation of the dam, nor does this report certify or conclude that the dam is either unsafe or safe. This preliminary evaluation has been very narrow, with an evaluation of conditions at only one location, and is intended only to provide an indication of whether or not additional studies should be pursued." The report also noted that the results of the exploration do not necessarily reflect variations that may exist at other portions of the dam, nor does the preliminary evaluation constitute a complete stability evaluation of the structure. The report concluded that "if the Standard Penetration Test results from

our boring are representative of the general condition of the embankment, it must be concluded that there is cause for concern regarding the low relative density of the sands, especially in the top 45 feet of the dam. This condition is of concern because under seismic shaking, such materials may contract and liquefy. Our analysis indicates the core materials may be subject to this problem under low levels of seismic shaking. Liquefaction of discrete layers of segments in a structure of this type may be significant in that it creates a layer(s) of very low shear resistance in the embankment and opens up the possibility of failure along circular slip paths (slope failures)." The report recommended further studies to determine the condition of fill materials in the outer portion of the embankment and preliminary slope stability analysis.

Prior to receipt by the Department of the $CH_2M$ Hill, Inc. report, *the Rainbow Water Company* on April 17, 1986 requested storage to gauge 80 during the summer. The Department on April 25, 1986 authorized storage to gauge 60 until October 1, after which date storage was to be maintained at gauge 40.

After reviewing the $CH_2M$ Hill, Inc. report in July 1986, the Department staff concluded that the embankment of Misselbeck Dam is susceptible to liquefaction under fairly low levels of seismic shaking at any water storage level (Ayers, 1986; Johnson, 1986). They also concluded that the area would be subject to slightly stronger shaking from earthquakes than that indicated in the report.

In view of the potential for embankment liquefaction, the inadequate spillway hydraulics, the deteriorating spillway lining, and the increasing potential for sediment to plug the outlet, the Department issued an order to *the Rainbow Water Company* on November 13, 1986 to submit a schedule by February 1, 1987 for making geotechnical, hydraulic, and structural studies of Misselbeck Dam, spillway, and outlet works (DWR, 1986). The studies were to include recommendations for remedial work to place the dam in compliance with acceptable safety standards. The order also offered the option to remove the dam from service. Storage was restricted to no higher than gauge 45 nor lower than gauge 40. The minimum storage restriction was imposed to preclude plugging of the outlet pipes by silt.

On January 21, 1987, *the Rainbow Water Company* requested an extension of time to comply with the November 13, 1986 order. *The* Rainbow Water Company was *exploring the possibility of hydroelectric generation and had engaged the firm of* Energy Engineering, Inc. to study the energy potential and costs to upgrade the dam. The Department responded by granting an extension to June 1, 1987 to comply with the order. On March 18, 1987, *the Rainbow Water Company* informed the Department that the hydroelectric generation potential was infeasible due to the costs to upgrade the dam.

The Rainbow Water Company informed customers on March 19, 1987 that water would not be available during the 1987 irrigation season due to storage restrictions imposed by the Department (RWC, 1987). The Department subsequently received numerous letters from water company customers citing the inadequate notice provided by the Rainbow Water Company and the need to store water to levels of the recent past for irrigation, domestic use, wildlife maintenance, and fire protection (DWR files). Customers of the water company and representatives of Shasta County expressed intention to identify a program to repair the dam or find an alternate source of water within the next 6 months (DWR, 1987). The Department informed the company on April 1, 1987 that storage to gauge 60 would be permitted for the 1987 irrigation season due to the hardship that the more restrictive reservoir *elevation would have on customers. The water company was reminded that a* satisfactory response to the November 13, 1986 order was due by June 1, 1987, and that satisfactory progress must be made in resolving the dam safety concerns by October 1, 1987, or the Department would have to commence actions to revoke the Certificate of Approval to store water.

The firm of Energy Engineering, Inc. proposed an emergency action plan to deal with safety concerns while the Rainbow Water Company developed plans to resolve safety deficiencies. *The Rainbow Water Company* informed the Department on April 14, 1987 that the emergency action plan would be developed only if permitted storage was increased to gauge 65 during wet years and gauge 75 during dry years. The Department informed *the Rainbow Water Company* on April 15, 1987 that increased storage levels would not be allowed because emergency action plans are not substitutes for safe dams. The Department further said the plan would be

acceptable for two to five years at reduced storage levels while the dam's safety deficiencies were being resolved, provided that no one inhabited the creek area for a reasonable distance downstream of the dam.

On June 26, 1987, the Department informed *the Rainbow Water Company* by letter that a schedule for the necessary studies of Misselbeck Dam had not been received as of the due date of June 1. *The Rainbow Water Company* was reminded of its responsibility and obligation to ensure safety of the dam and that satisfactory progress must be made in resolving the dam safety concerns by October 1, 1987 or actions would be begun to revoke the Certificate of Approval to store water.

The Department received a letter dated June 29, 1987 from the Rainbow Water Company giving an estimate by Energy Engineering, Inc. of $625,000 to rehabilitate Misselbeck Dam. The estimate included remedial work to repair the spillway and faces of the dam, but did not address the issues of seismic hazard or condition of the outlet pipes. The letter further stated that no funds were available for the identified work.

No progress had been made by October 1, 1987 in resolving the safety deficiencies of Misselbeck Dam. The Department, therefore, began actions *that would lead* to revocation of the Certificate of Approval to store water. An initial study (Appendix A) to determine possible significant impacts that could result from such revocation was completed on January 21, 1988 and distributed to governmental agencies and affected groups. This study identified several *possible significant* impacts, thus necessitating the completion of an Environmental Impact Report, as required by the California Environmental Quality Act of 1970.

*The Draft Environmental Impact Report was completed in July, 1989, and scheduled for printing for public distribution. Prior to the availability of the report, the Rainbow Water Company was sold to the Igo-Ono Community Services District effective August 8, 1989. The Draft Environmental Impact Report was available for public review on October 1, 1989. A public hearing to receive comments on the report was held at Ono on November 2, 1989 (Appendix C). Written comments on the Draft Environmental Impact Report were due by November 15, 1989. While no*

*public agency submitted comments, comments on the draft report were received from several individuals (Appendix C). Other individuals, while not commenting on the draft report, reiterated concerns for the possible significant effects that had been identified in the report (Appendix D).*

**Regulatory Setting**

The *Igo-Ono Community Services District,* whose primary *water supply* facilities are Misselbeck Dam, Hoover Dam, and the Happy Valley Irrigation Canal, acts under a certificate of public convenience and necessity for public utility water service issued by the California Public Utilities Commission.

The Department of Water Resources, Division of Safety of Dams, has jurisdiction over the construction, enlargement, alteration, repair, maintenance, operation, and removal of dams and reservoirs for the protection of life and property (Division 3 of the California Water Code). A dam is defined as any artificial barrier which does or may impound or divert water and which is 25 feet or more in height from the downstream toe of the barrier to the maximum possible water storage elevation or impounds 50 acre-feet or more of water. A barrier not in excess of 6 feet in height, regardless of storage capacity, or which stores not more than 15 acre-feet of water, regardless of height, is not considered a dam.

In determining whether or not a dam or reservoir constitutes a danger to life or property, the Water Code states that the Department "shall take into consideration the possibility that the dam or reservoir might be endangered by seepage, earth movement, or other conditions which exist or which might occur in any area in the vicinity of the dam or reservoir. Whenever the Department deems that any such condition endangers a dam or reservoir, it shall order the owner to take such action as the Department determines to be necessary to remove the resultant danger to life and property." .The Water Code further gives the Department authority to require owners of dams to perform engineering, geologic, and other work, as necessary, to disclose information sufficient to enable the Department to determine structural integrity of dams and to perform other work necessary to safeguard life and property. The owner of a dam has the option of complying with Department orders,

removing the dam from service so that it no longer will impound water, or reducing the size of the dam and reservoir to less than the size of a jurisdictional dam.

The Department issues a Certificate of Approval that prescribes limitations for the safe impoundment of water. Whenever a dam or reservoir has been determined to endanger life and property, the Department may either amend the terms and conditions of an existing certificate (which may include requiring an owner to lower the water level or empty the reservoir) by issuing a revised certificate or revoke the Certificate of Approval to impound water. After a certificate has been revoked, the owner of a dam is prohibited from taking actions or inactions that cause the dam to impound water.

The California Environmental Quality Act requires the Department to consider the environmental effects of an amendment or revocation before taking action to alter a Certificate of Approval. An initial study was completed on January 21, 1988 which determined that significant environmental impacts would result from revocation of the Certificate of Approval to impound water behind Misselbeck Dam. The Department, as the lead agency, prepared and distributed to responsible agencies on January 22, 1988 a Notice of Preparation that stated the Department's intention to proceed with an Environmental Impact Report, in accordance with *California Environmental Quality Act* guidelines. A scoping session was held at the Ono Grange Hall on March 17, 1988. *The Draft Environmental Impact Report was available for review and comment between October 1 and November 15, 1989. A public hearing to receive comments was held at the Ono Grange Hall on November 2, 1989. Responses to comments received on the draft report are included in this Final Environmental Impact Report.*

After an Environmental Impact Report has been completed, the Water Code allows the Department to modify the Certificate of Approval or conduct a hearing to consider revocation. Revocation of the Certificate of Approval to impound water requires the owner to take measures to ensure that no water is impounded, through action or inaction, behind the dam. Modifications to the dam to preclude impounding water requires approval and inspection by the Department.

## PROJECT DESCRIPTION

This project is an order by the Division of Safety of Dams of the Department of Water Resources that would revoke the Certificate of Approval issued April 29, 1981 for Misselbeck Dam and Reservoir, State Application Number 2220-2. Revocation of the certificate would prohibit at any time the impoundment of water behind the dam. The prohibition of impoundment would require the *Igo-Ono Community Services District* to modify, breach, or remove the dam to preclude impoundment of water, since the outlet facilities are not capable of passing all water in the stream during periods of high flow. A new Certificate of Approval could be issued if investigations and repairs are completed by the *district* that comply with the safety requirements of the Department.

The objective of the project is to eliminate the risk to life or property caused by failure of the dam. The dam could fail as a result of erosion of the spillway during high flows or liquefaction of the dam embankment during a moderate or strong earthquake. The potential for failure of the spillway would increase should the outlet pipes become plugged by sediment or debris. This would eliminate any means of controlling water storage levels behind the dam, except by allowing water to escape over the inadequate spillway. Damage caused by a liquefaction failure would also be greater because there would be more water *released from* the reservoir.

### Project Location

Misselbeck Dam and Reservoir (the latter also known as Rainbow Lake) are located in Sections 29, 30, and 31, Township 31 North, Range 7 West, Mount Diablo Base and Meridian (Figure 1). The dam is in Shasta County about 16 miles southwest of Redding. The dam impounds water in the North Fork of Cottonwood Creek, which is a tributary to the Sacramento River.

### Safety Concerns

Misselbeck Dam has several deficiencies that make impoundment of water unsafe.

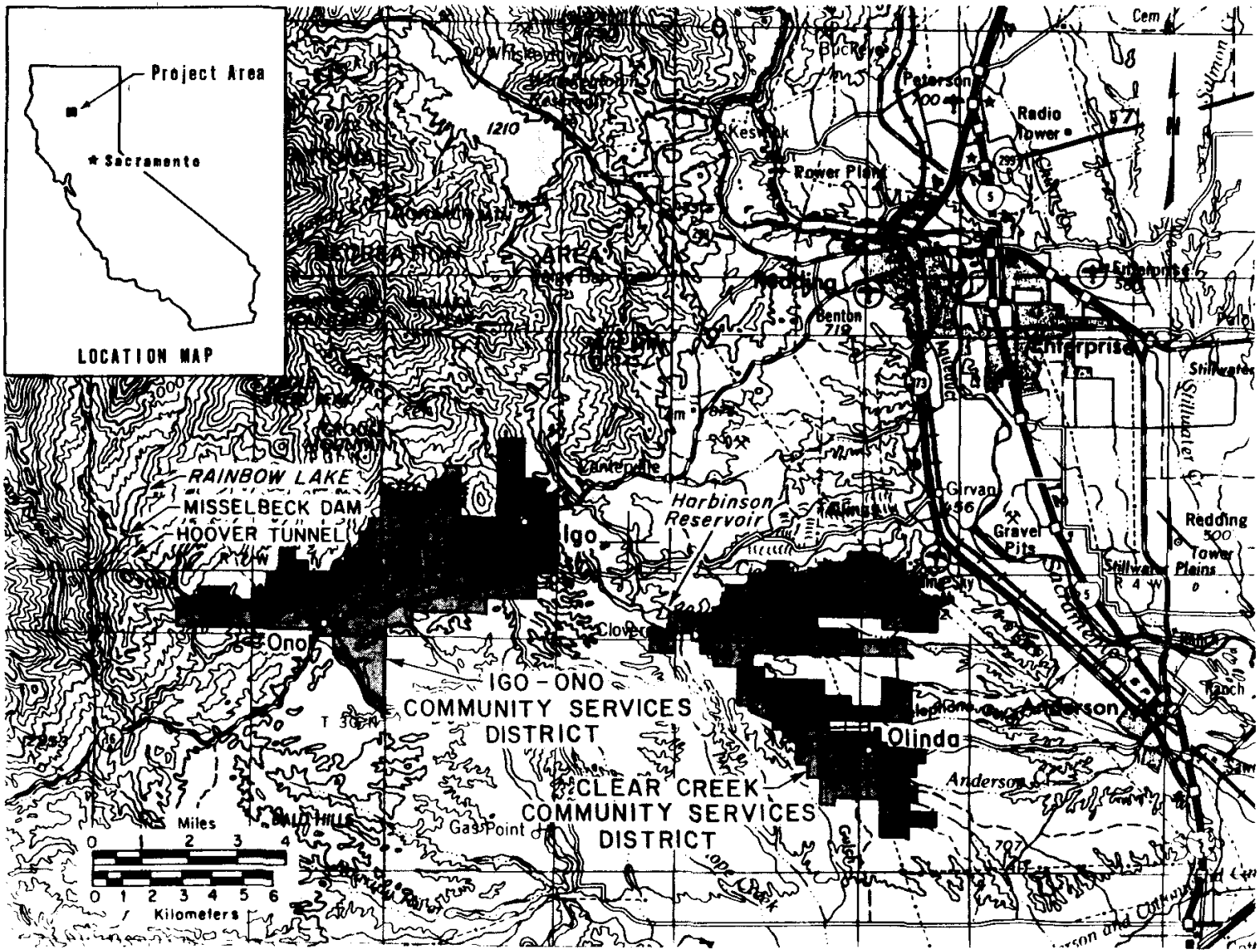



Figure 1. Location of the Project Area.

At least a portion of the dam embankment has been determined to be subject to liquefaction at any reservoir storage level under fairly low levels of earthquake shaking. The spillway is hydraulically inadequate, allowing overtopping and erosion of backfill materials by moderate surface runoff. The structural integrity of the spillway is also questionable, as evidenced by continuing deterioration and undermining of a portion of one of the spillway walls and spalling of the spillway floor, which has exposed badly corroding steel reinforcing bars. The outlet pipes could be plugged by sediment that has filled the reservoir to *about 18* feet higher than the crown of the intake to the pipes. *The outlet pipes became temporarily plugged with sloughing sediment on several occasions during December of 1989 and January of 1990.*

*Failure of the dam would result in the discharge of about 7,663,000 cubic yards (4,750 acre-feet) of water and sediment to the North Fork of Cottonwood Creek. This discharge would effect several residences and ranches, several bridges, anadromous fish spawning habitat, and people working or recreating in the floodplain.*

*Previous owners of the dam have failed to comply with orders from the Division of Safety of Dams directing correctional work. The Department of Water Resources, therefore, has initiated proceedings to revoke the Certificate of Approval issued April 29, 1981 for Misselbeck Dam and reservoir.*

**Regulatory Action**

The Department has prepared this Environmental Impact Report to identify impacts that may result from implementation of an order revoking the Certificate of Approval, alternatives to the order, and measures to mitigate unavoidable impacts. Information contained in this report will be considered by the Department pursuant to the *California Environmental Quality Act, along with other information such as structural analyses and safety factors,* in the process of determining whether the Certificate of Approval for Misselbeck Dam should be revoked.

Information in the Environmental Impact Report may be used by other regulatory agencies to issue permits or approvals necessary for the owner of the dam to fulfill

the intent of any order that the Department may issue. Both the Central Valley Regional Water Quality Control Board and the Department of Fish and Game will consider the nature and extent of unavoidable environmental impacts identified in the Environmental Impact Report prior to issuing permits or approvals.

## ENVIRONMENTAL SETTING

*The California Environmental Quality Act* requires consideration of the environmental setting affected by the project. The environmental setting includes physical features of the water system and uses of delivered water.

### Facilities

The main features of the Igo-Ono Community Services District include Misselbeck Dam, Rainbow Lake, Hoover Dam, Hoover Tunnel, and the Happy Valley Irrigation Canal (Figure 2). Misselbeck Dam is a hydraulic fill structure with a length of about 1,110 feet and a width that varies from 20 feet at the crest to approximately 600 feet at the toe. The faces of the dam have slopes of 2.5:1 on the downstream side and 3:1 on the upstream side. The upstream face was originally covered with two inches of gunite, which is now severely cracked and heaved. Elevation at the dam crest is about 2,026 feet above sea level. Height from the toe to the crest of the dam is 96 feet (Swanson, 1974a). The dam contains about *250,000* cubic yards of fill (W. Bennett, DWR, pers. comm.). The spillway, located at the west end of the dam, is 100 feet wide at the top, but narrows to 30 feet at the chute entrance. The chute narrows to approximately 15 feet at the downstream end (Magaldi, 1965). The discharge capacity of the spillway is about 16,000 cubic feet *of water* per second (cfs) (Engle, 1935; Marchant, 1989). Total freeboard between the dam crest and spillway crest is 14 feet.

Rainbow Lake floods an area of about 113 acres. Original storage capacity was estimated as 4,300 acre-feet at the spillway crest and 6,100 acre-feet at the dam crest (Engle, 1935). Obstruction of the spillway with a 4.5 foot high bulkhead until 1956 increased storage to 4,800 acre-feet at the bulkhead crest. Siltation by 1981 to gauge height 32 (Parlier, 1981) reduced maximum storage by approximately 470 acre-feet (Figure 3). An estimate of storage capacity in July 1987 indicates loss of about 700

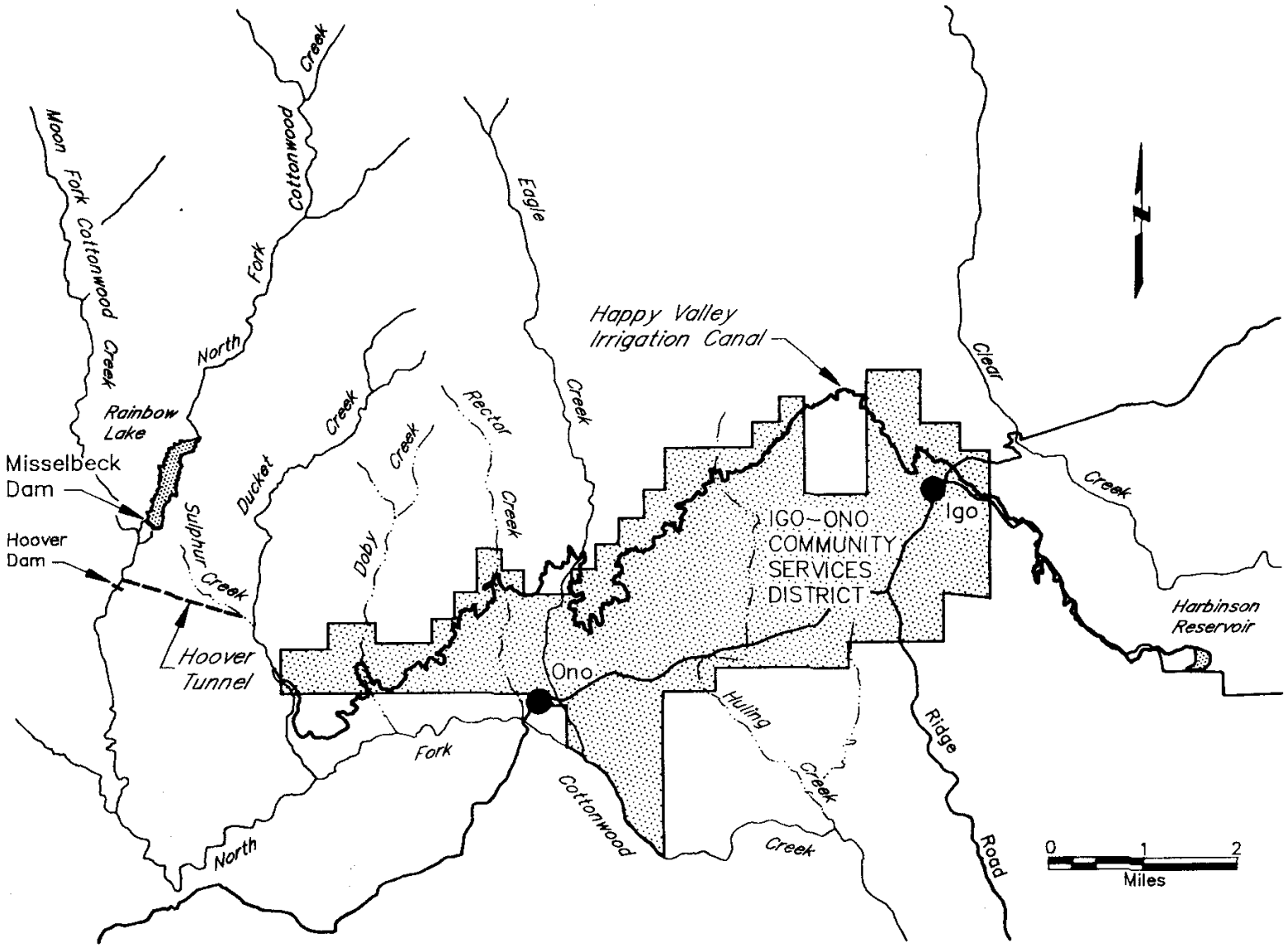



**Figure 2. Facilities of the Rainbow Water Company and the Igo-Ono Community Services District.**

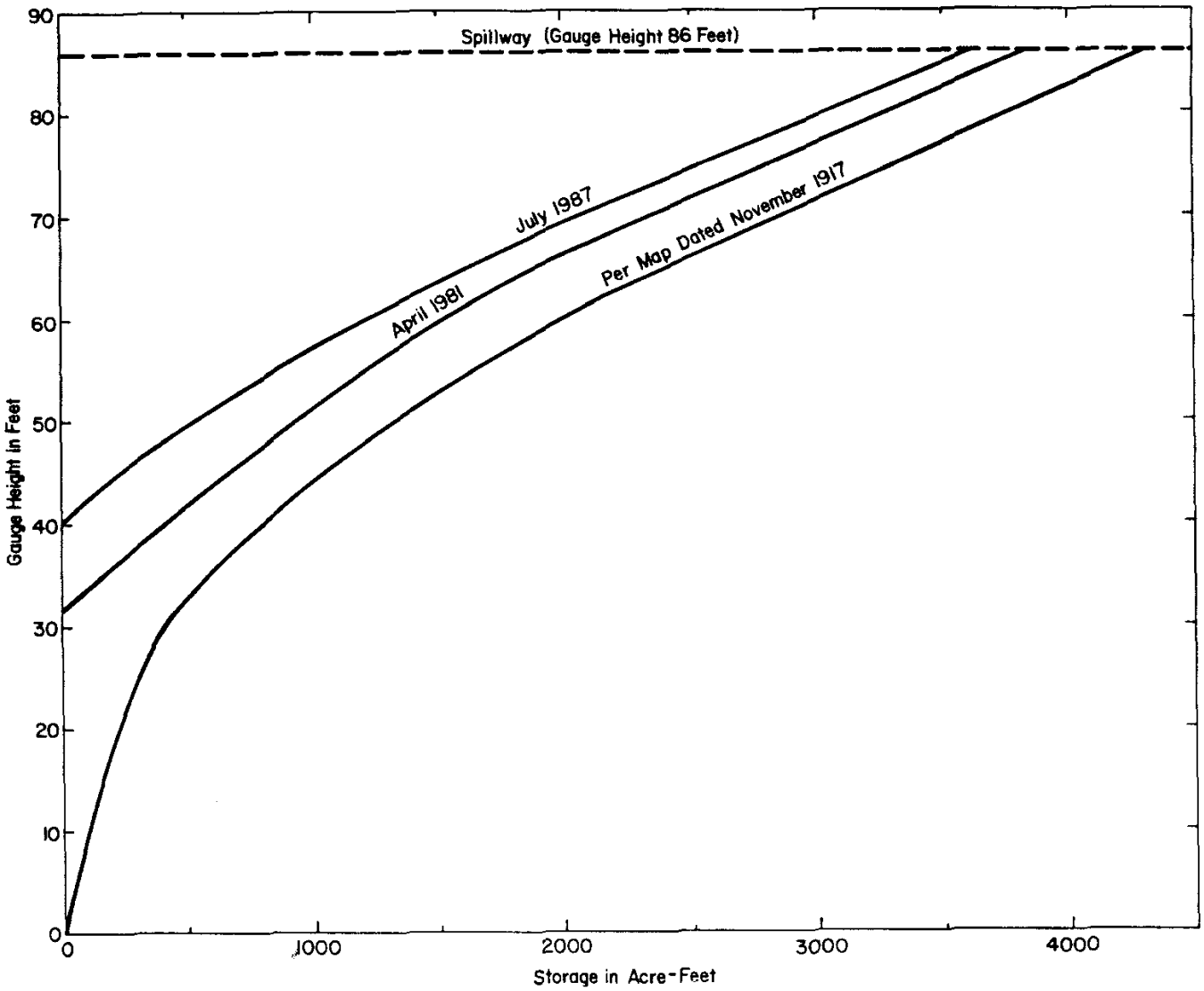



Figure 3. Area-Capacity Relationship for Rainbow Lake.

acre-feet with the sediment deposit approaching gauge 40. Storage capacity to the spillway crest is estimated at 3,600 acre-feet.

Controlled releases from Misselbeck Dam are made from two 30-inch diameter steel pipes that are located in a tunnel about 10 feet in diameter. The crown of the outlet tunnel is at a gauge height of 22 feet. Gate valves are located *on the outlet pipes* at both upstream and downstream ends of the *tunnel*. The pipes direct water releases to the North Fork of Cottonwood Creek.

Hoover Dam is located about 0.7 mile downstream from Misselbeck Dam. Original storage capacity of the 40 foot high concrete arch structure is unknown. The dam was removed from jurisdiction by the Department in 1933 for lack of sufficient storage to qualify as a dam. Hoover Dam continues to divert water into Hoover Tunnel, which extends 1.25 miles to Sulphur Creek. This water flows about 0.25 mile to Ducket Creek (also known as Hoover Creek), and then about 0.5 mile to the Happy Valley Irrigation Canal extending 17 miles to Harbinson Reservoir. About 53 miles of lateral ditches supply water from the main canal to customers. The water supply is augmented by natural flows in Moon Fork and Ducket, Rector (Byron), Huling (Hulen), and Eagle creeks. Doby (Dobey) Creek, though flowing past the canal, has not been used to augment the water supply for about 50 years (M. Foster, Rainbow Water Company, pers. comm.).

**Water Rights**

*The Igo-Ono Community Services District* possesses pre-1914 appropriative water rights originally adjudicated to the Happy Valley Irrigation District and James Gobel in a 1920 decree and appropriative water rights under Permit 533 (Application 784, License 2461) issued in 1942 by the State Water Commission (now the State Water Resources Control Board). The 1920 decree allows the *district* to divert from the natural flow of the North Fork of Cottonwood Creek into the Happy Valley Irrigation Canal a continuous flow of 16 cfs during the irrigation season (March 15 to November 1), subject to reduction during periods of shortage according to the allotment ratios of other users (Table 1). The decree also entitles the *district* to divert into the irrigation canal the natural flow of Ducket, Doby, Rector, and Huling

Table 1. Appropriative water rights in the North Fork Cottonwood Creek Watermaster Service Area (DWR, 1978)

| Present Owner | Decreed Owner | Diversion Name | Amount (cfs) |
|---|---|---|---|
| | Water Rights Not Subject to Proportionment | | |
| Shoup, L. | Moon, J. | Moon Fork | 1.625 |
| *Igo-Ono C.S.D.* | Gobel, J. | N.F. above reservoir | 0.30 |
| *Igo-Ono C.S.D.* | Happy Valley I.D. | N.F. above reservoir | 0.30 |
| Morsicano, L. | Sunny Hill Mining | N.F. above reservoir | 0.05 |
| Orr, R. | Greene, S. & F. | Jerusalem Cr. | 1.25 |
| Taylor, J. | Hamlin, B. | Jerusalem Cr. | 1.25 |
| Shoup, C. | Grant, J. | N.F. Cottonwood Cr. | 0.05 |
| | Water Rights Subject to Proportionment | | |
| Westlake, L. | Bee Cr. Ditch Co. | N.F. Cottonwood Cr. | 1.55 |
| Taylor, J. | Bee Cr. Ditch Co. | N.F. Cottonwood Cr. | 0.65 |
| Barr, W. | Bee Cr. Ditch Co. | N.F. Cottonwood Cr. | 1.08 |
| Shoup, L. | Bee Cr. Ditch Co. | N.F. Cottonwood Cr. | 0.66 |
| Shoup, C. | Bee Cr. Ditch Co. | N.F. Cottonwood Cr. | 1.16 |
| Big Valley Ranch | Sweeny, M. and F. Henriques | N.F. Cottonwood Cr. | 2.50 |
| Mt. View Ranch | Heins, H. & H. and J. & F. Ponte | N.F. Cottonwood Cr. | 0.875 |
| Flying Ridge Ranch | Heins, H. & H. and J. & F. Ponte | N.F. Cottonwood Cr. | 0.875 |
| McCauley, G. et al. | Shasta Dredging | N.F. Cottonwood Cr. | 0.125 |
| *Igo-Ono C.S.D.* | Happy Valley I.D. | N.F. Cottonwood Cr. | 16.0 |

creeks at the point where the canal crosses the creeks, and all the natural flow of Eagle Creek reaching the head of the Eagle Creek Ditch. The 1920 decree allotted 0.3 cfs from the North Fork of Cottonwood Creek to each of James Gobel and the irrigation district to be used on lands lying upstream of Rainbow Lake. The *Igo-Ono Community Services District* presently owns these water rights, but diverts the 0.6

cfs through the Hoover Tunnel to the canal. The *Igo-Ono Community Services District*, therefore, can appropriate up to 16.6 cfs from the North Fork of Cottonwood Creek.

The appropriative water right under Permit 533 authorizes storage of 4,800 acre-feet of water per year in Rainbow Lake for domestic and irrigation uses on 18,110 acres of land. The water right may have been reduced due to reservations made upon sale of the Happy Valley Water Company to the Trisdale Water Company in 1967. The former company reserved the right, option, and privilege of diverting in perpetuity up to 100 inches under a 6-inch head (2.5 cfs) from the first flow of the water in the North Fork of Cottonwood Creek above Hoover Dam and 20 percent of the water up to 200 inches (5 cfs) at the Dry Creek outlet of the Happy Valley Irrigation Canal during the irrigation season. The reservation for 100 inches has been transferred to Rainbow Lake Properties. The 200-inch reservation has not been used by the Happy Valley Water Company. Additional loss of the water right could occur through filing with the Division of Water Rights of the State Water Resources Control Board for water not presently being stored behind Misselbeck Dam due to loss of storage capacity from sedimentation and the storage restriction imposed by the Department.

**Service Area**

Prior to 1967, water was provided to three service areas by the water company. Division 1 encompassed lands between Ducket Creek and Eagle Creek, with the community of Ono the main population center. Division 2 encompassed lands between Eagle Creek and Harbinson Reservoir, with the community of Igo as the main population center. Division 3 encompassed 5,000 acres in the Olinda area. Since 1967, water has been provided to Division 3 through the Muletown Conduit of the Clear Creek South Unit of the Bureau of Reclamation's Central Valley Project. Divisions 1 and 2, which formed the Igo-Ono Community Services District in 1964, continue to be served by the water company (Figure 2).

The Igo-Ono Community Services District encompasses about *8,500* acres (*DWR*, 1964d). It is divided into 235 parcels with an assessed valuation of $6,908,000 (L. Preston, Shasta County Office of Special Districts, pers. comm.). The limited

economic activity of the area is almost exclusively devoted to agriculture (Gelonek, 1968). Some native stone is quarried and timber is sold for firewood. Mining, once an important part of the economy, now has a minor economic role.

Soils and lands classification maps produced by the U. S. Department of Agriculture indicate that about 4,800 acres of land in the district are arable (Gelonek, 1968). Physical barriers, remoteness from economical distribution systems, and localized factors, such as poor soil drainage and steep terrain, reduce lands that could be irrigated for crop production to about 2,900 acres.

The communities of Igo and Ono are the population and business centers for the surrounding areas comprising the community services district. The Igo area has about 300 residents, while the Ono area has about 100 residents (L. Preston, pers. comm.). The population in the district has grown little during the past 20 years.

Turnouts from the Happy Valley Irrigation Canal provide water directly to between 42 and 48 customers of the *Igo-Ono Community Services District*, while another 16 are served from water redistributed at Ono and 6 are served from water redistributed at Igo (M. Foster, pers. comm.). Most residents in the district have private wells or rely on springs for domestic water. Most shallow wells located adjacent to the irrigation canal are probably recharged by seepage from the ditch (Gelonek, 1968). Wells in other areas of the district are usually inadequate in both water quantity and quality.

An annual average of 550 acre-feet of water was delivered to customers of the water company in the district between the years 1982 and 1987 (M. Foster, pers. comm.). The maximum delivery was 600 acre-feet in 1984, while the minimum delivery was 500 acre-feet in 1983. Restrictions on storage levels behind Misselbeck Dam and leakage from the irrigation canal severely limit the amount of water available to the service area. An estimated 3,400 acre-feet of water could be immediately used for irrigation of about 1,010 acres if water were available (Gelonek, 1968).

## Hydrology

The drainage basin upstream from Misselbeck Dam encompasses about 12 square miles, ranging in elevation from 2,012 feet at the spillway crest to 5,955 feet in the upper watershed (Elford and McDonough, 1965). Estimates of total average seasonal precipitation range from 40 inches at the lower elevations to 50 inches in the higher reaches (Elford and McDonough, 1965; Rantz, 1969). Snowfall accounts for about 2.3 inches of the total precipitation at the lower elevations to 6.3 inches at higher elevations. Between 75 to 90 percent of the annual precipitation occurs from November 1 to April 30.

The North Fork of Cottonwood Creek originates in the upper drainage basin of Misselbeck Dam. The average annual runoff at Misselbeck Dam from the watershed has been estimated at 20,000 acre-feet ($CH_2M$ Hill, 1980). The peak floodflows into the reservoir have been estimated at 3,730 cfs for floods with a recurrence of 100 years, and 6,092 cfs for floods with a recurrence of 8,000 years (Marchant, 1989). Volumes of water produced in a 72 hour period by floods with return frequencies of 1-in-100 years and 1-in-8,000 years were calculated at 5,568 acre-feet and 10,100 acre-feet, respectively.

The North Fork of Cottonwood Creek is joined by Moon Fork about 0.3 mile downstream from Misselbeck Dam. The average annual runoff from Moon Fork has been estimated at 15,000 acre-feet of water ($CH_2M$ Hill, 1980).

Several other small streams flow through the Igo-Ono Community Services District before joining the North Fork of Cottonwood Creek. These include Ducket, Doby, Rector, Eagle, and Huling creeks.

The North Fork of Cottonwood Creek converges with the Middle Fork of Cottonwood Creek about 7.5 miles south of Igo. The main stem of Cottonwood Creek then flows to the Sacramento River, merging near the town of Cottonwood, which is located between Redding and Red Bluff.

Little stream discharge data are known for streams in the district. Stream discharge

gauges were maintained during the 1983 water year (October 1982 through September 1983) at the North Fork of Cottonwood Creek between Moon Fork and Misselbeck Dam (Table 2) and at Moon Fork (Table 3). The 1983 water year was, however, abnormally wet. The discharges recorded at the North Fork gauge included natural streamflow plus releases from reservoir storage. Stream discharges attributable solely to natural streamflow (Table 4) were calculated using discharge data from Moon Fork and the runoff ratio (3:4) between Moon Fork and the North Fork ($CH_2M$ Hill, 1983). These data indicate that minimum natural flows below the confluence of Moon Fork and the North Fork may have been about 14.7 cfs during September 1983.

Reservoir storage was depleted during the summers of 1986 and 1987. Discharge from the North Fork flowed through the reservoir unaugmented by storage releases by late summer. Discharge measurements of the North Fork between Moon Fork and Misselbeck Dam indicated a minimum flow of 5.4 cfs on October 17, 1986 and 3.26 cfs on September 29, 1987 (M. Trisdale, Rainbow Water Company, pers. comm.). The calculated discharge for the North Fork below the confluence of Moon Fork on October 17, 1986 is 9.5 cfs and on September 29, 1987 is 5.7 cfs. Flow measurements on September 21, 1988 found 4.85 cfs in the North Fork immediately upstream from Rainbow Lake and 4.03 cfs in Moon Fork near the confluence with the North Fork, for a combined flow of 8.88 cfs (Steve Turek, DWR, pers. comm.). Runoff in Northern California in 1986 was above normal, while that in 1987 and 1988 was less than normal.

Historic discharge measurements of Ducket, Doby, Rector, and Huling creeks are not available. Observations, however, indicate that only Ducket Creek maintains a flow, though only about 0.25 cfs in the late summer (M. Trisdale, pers. comm.). Measurements on Eagle Creek during prior years indicate a late summer flow of about 1.25 cfs. Flow measurements taken on September 20 and 21, 1988 found 0.21 cfs in Ducket Creek, 0.02 cfs in Doby Creek, 0.97 cfs in Eagle Creek, and 0.03 cfs in Sulphur Creek (Steve Turek, pers. comm.). Neither Rector nor Huling creeks contained any flow.

Table 2. Discharge (cfs) data for North Fork of Cottonwood Creek near Ono, above Moon Fork (Water Year 1983; DWR watermaster files)

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.3 | 11.1 | 48.6 | 43.2 | 278 | 321 | 347 | 256 | 103 | 27.9 | 18.9 | 12.2 |
| 2 | 10.3 | 11.1 | 54.4 | 42.4 | 272 | 721 | 347 | 253 | 103 | 27.9 | 18.9 | 12.2 |
| 3 | 10.3 | 11.1 | 47.8 | 41.0 | 258 | 520 | 340 | 253 | 102 | 27.9 | 18.9 | 12.2 |
| 4 | 10.5 | 13.2 | 43.9 | 39.6 | 237 | 334 | 340 | 248 | 102 | 27.9 | 18.9 | 12.2 |
| 5 | 10.5 | 15.8 | 27.9 | 38.2 | 217 | 327 | 337 | 253 | 102 | 7.9 | 18.9 | 12.2 |
| 6 | 10.5 | 15.8 | 23.8 | 37.5 | 217 | 327 | 334 | 253 | 100 | 27.9 | 18.9 | 12.2 |
| 7 | 10.5 | 15.8 | 24.8 | 36.9 | 213 | 327 | 330 | 248 | 100 | 27.9 | 18.9 | 12.2 |
| 8 | 10.5 | 17.7 | 21.9 | 36.9 | 208 | 327 | 330 | 245 | 98.9 | 27.9 | 14.8 | 12.2 |
| 9 | 10.3 | 19.7 | 19.7 | 36.2 | 213 | 334 | 327 | 240 | 98.9 | NR | 13.2 | 12.2 |
| 10 | 10.3 | 19.3 | 19.7 | 33.7 | 217 | 337 | 324 | 235 | 97.5 | NR | 12.5 | 12.2 |
| 11 | 10.0 | 19.3 | 19.7 | 29.0 | 222 | 334 | 324 | 227 | 62.9 | NR | 12.2 | 12.2 |
| 12 | 10.3 | 18.9 | 19.7 | 30.7 | 232 | 347 | 321 | 230 | 43.2 | NR | 12.2 | 12.2 |
| 13 | 10.3 | 18.9 | 19.7 | 32.4 | 240 | 357 | 314 | 227 | 43.2 | NR | 12.2 | 12.2 |
| 14 | 10.3 | 18.5 | 19.3 | 34.9 | 245 | 334 | 308 | 215 | 43.2 | NR | 12.2 | 12.2 |
| 15 | 10.3 | 18.1 | 20.6 | 30.7 | 248 | 330 | 165 | 148 | 43.2 | NR | 12.2 | 12.2 |
| 16 | 10.3 | 17.3 | 29.0 | 31.2 | 250 | 330 | 132 | 47.0 | 43.2 | NR | 12.2 | 12.2 |
| 17 | 10.3 | 16.6 | 44.7 | 32.4 | 253 | 330 | 132 | 49.4 | 36.2 | NR | 12.2 | 12.2 |
| 18 | 10.3 | 16.9 | 55.4 | 36.2 | 256 | 334 | 132 | 50.3 | 20.6 | NR | 12.2 | 12.2 |
| 19 | 10.0 | 16.9 | 56.3 | 47.8 | 248 | 334 | 131 | 51.1 | 20.6 | NR | 12.2 | 12.2 |
| 20 | 10.0 | 16.9 | 65.9 | 59.1 | 240 | 334 | 132 | 52.8 | 20.6 | NR | 12.2 | 12.2 |
| 21 | 10.0 | 16.9 | 76.6 | 63.9 | 232 | 337 | 132 | 53.7 | 20.6 | NR | 12.2 | 12.2 |
| 22 | 10.0 | 17.7 | 167 | 44.7 | 222 | 334 | 132 | 54.5 | 20.6 | NR | 12.2 | 12.2 |
| 23 | 10.3 | 17.7 | 267 | 46.2 | 217 | 334 | 136 | 55.4 | 21.0 | 18.9 | 12.2 | 12.2 |
| 24 | 10.5 | 17.7 | 253 | 70.0 | 213 | 340 | 141 | 56.3 | 21.0 | 18.9 | 12.2 | 12.2 |
| 25 | 10.5 | 17.7 | 225 | 89.7 | 206 | 340 | 144 | 57.2 | 21.0 | 18.9 | 12.2 | 12.2 |
| 26 | 10.8 | 17.7 | 203 | 146 | 201 | 340 | 146 | 58.1 | 21.0 | 18.9 | 12.2 | 12.2 |
| 27 | 10.8 | 17.7 | 118 | 225 | 215 | 343 | 148 | 81.1 | 21.0 | 18.9 | 12.2 | 12.2 |
| 28 | 10.8 | 18.5 | 58.1 | 275 | 256 | 340 | 196 | 106 | 21.0 | 18.9 | 12.2 | 12.2 |
| 29 | 11.1 | 30.7 | 54.5 | 284 | - | 347 | 253 | 106 | 22.8 | 18.9 | 12.2 | 12.2 |
| 30 | 10.8 | 42.4 | 51.9 | 281 | - | 347 | 256 | 104 | 27.9 | 18.9 | 12.2 | 12.2 |
| 31 | 10.8 | - | 46.2 | 272 | - | 347 | - | 104 | - | 18.9 | 12.2 | - |
| Second-foot-days | 322.5 | 543.6 | 2203.1 | 2547.5 | 6526 | 10988 | 7131 | 4617.91 | 1602.1 | 393.3 | 429.0 | 366.0 |
| Mean | 10.4 | 18.1 | 71.1 | 82.2 | 233 | 354 | 238 | 149.0 | 53.4 | NR | 13.8 | 12.2 |

NR=No Record

Stream discharge from the North Fork of Cottonwood Creek has been recorded since 1956 at a U. S. Geological Survey gauging station located 1.2 miles downstream from Huling Creek and 4.5 miles upstream from the Middle Fork of Cottonwood Creek. Peak flows of 14,300 cfs on December 21, 1955 and 11,000 cfs on December 22, 1964 were calculated from a rating curve and high water marks (USGS, 1978). The lowest flow recorded at the gauge occurred during mid-September 1977. Only 0.3 cfs of water was flowing in the North Fork of Cottonwood Creek at the gauge. The

Table 3. Discharge (cfs) data for Moon Fork of Cottonwood Creek near Ono (Water Year 1983; DWR watermaster files)

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.39 | 11.1 | 29.8 | 28.0 | 107 | 1140 | 216 | 133 | 70.9 | 30.4 | 15.2 | 11.4 |
| 2 | 6.39 | 9.66 | 26.3 | 26.9 | 97.2 | 4180 | 184 | 122 | 68.8 | 30.4 | 15.2 | 11.1 |
| 3 | 6.30 | 8.84 | 22.7 | 26.3 | 87.0 | 2115 | 164 | 117 | 68.8 | 28.6 | 14.9 | 10.5 |
| 4 | 6.30 | 8.33 | 21.2 | 26.3 | 89.5 | 782 | 144 | 126 | 61.7 | 27.4 | 14.5 | 9.38 |
| 5 | 6.30 | 7.98 | 20.3 | 26.3 | 89.5 | 617 | 144 | 126 | 61.7 | 27.4 | 14.5 | 9.38 |
| 6 | 6.39 | 7.70 | 18.9 | 26.3 | 161 | 455 | 131 | 122 | 61.7 | 26.9 | 14.5 | 9.38 |
| 7 | 6.58 | 7.60 | 17.6 | 26.3 | 138 | 462 | 126 | 115 | 60.7 | 26.3 | 14.1 | 9.11 |
| 8 | 6.48 | 7.60 | 16.4 | 26.9 | 170 | 295 | 123 | 108 | 57.9 | 26.9 | 13.4 | 8.84 |
| 9 | 6.48 | 8.08 | 15.6 | 26.3 | 184 | 228 | 118 | 103 | 56.9 | 26.9 | 13.4 | 8.84 |
| 10 | 6.30 | 7.79 | 15.2 | 25.3 | 190 | 201 | 111 | 99.9 | 56.0 | 26.9 | 13.4 | 8.33 |
| 11 | 6.21 | 7.60 | 15.6 | 24.7 | 166 | 180 | 110 | 95.9 | 55.1 | 26.3 | 13.1 | 8.08 |
| 12 | 6.12 | 7.60 | 15.6 | 24.7 | 188 | 138 | 103 | 93.3 | 55.1 | 25.8 | 13.1 | 8.08 |
| 13 | 6.12 | 7.60 | 15.3 | 24.2 | 168 | 761 | 98.5 | 90.7 | 52.4 | 25.8 | 12.7 | 7.89 |
| 14 | 6.12 | 7.51 | 14.5 | 23.7 | 150 | 358 | 94.6 | 88.2 | 50.7 | 24.7 | 13.1 | 7.79 |
| 15 | 6.12 | 7.41 | 26.3 | 23.7 | 139 | 255 | 93.3 | 85.8 | 49.0 | 23.7 | 13.1 | 7.79 |
| 16 | 6.03 | 7.32 | 122 | 26.3 | 126 | 212 | 93.3 | 84.6 | 48.2 | 22.7 | 13.4 | 7.60 |
| 17 | 6.12 | 8.84 | 85.8 | 26.3 | 117 | 190 | 90.7 | 83.4 | 45.8 | 21.7 | 13.1 | 7.60 |
| 18 | 6.12 | 25.3 | 49.0 | 42.6 | 144 | 188 | 92.0 | 82.2 | 45.0 | 21.2 | 12.7 | 7.60 |
| 19 | 6.12 | 18.9 | 39.7 | 39.7 | 122 | 170 | 99.9 | 81.0 | 44.2 | 20.7 | 12.4 | 7.51 |
| 20 | 6.12 | 16.4 | 47.4 | 35.5 | 110 | 178 | 97.2 | 82.2 | 42.6 | 19.8 | 12.7 | 7.51 |
| 21 | 6.76 | 16.4 | 117 | 34.8 | 103 | 196 | 94.6 | 82.2 | 41.1 | 19.4 | 12.4 | 7.51 |
| 22 | 9.94 | 15.2 | 82.2 | 36.2 | 97.2 | 201 | 94.6 | 83.4 | 41.1 | 18.9 | 12.1 | 8.58 |
| 23 | 13.8 | 17.6 | 61.7 | 49.9 | 97.2 | 199 | 148 | 82.2 | 39.7 | 18.5 | 12.4 | 7.51 |
| 24 | 9.38 | 16.0 | 50.7 | 98.5 | 99.9 | 196 | 129 | 81.0 | 37.5 | 18.1 | 12.4 | 6.85 |
| 25 | 13.4 | 15.6 | 45.0 | 90.7 | 105 | 180 | 123 | 81.0 | 36.2 | 18.1 | 11.8 | 6.58 |
| 26 | 16.4 | 15.6 | 40.4 | 568 | 114 | 188 | 115 | 81.0 | 34.8 | 17.6 | 11.4 | 6.30 |
| 27 | 9.66 | 16.4 | 37.5 | 276 | 252 | 216 | 117 | 79.8 | 32.9 | 16.8 | 11.1 | 6.48 |
| 28 | 8.58 | 25.8 | 34.8 | 194 | 590 | 192 | 123 | 78.7 | 32.2 | 16.4 | 10.8 | 6.48 |
| 29 | 13.8 | 40.4 | 32.2 | 192 | - | 237 | 139 | 77.5 | 31.6 | 16.4 | 10.8 | 6.30 |
| 30 | 20.7 | 38.2 | 30.4 | 153 | - | 312 | 139 | 74.2 | 30.4 | 16.0 | 10.8 | 6.30 |
| 31 | 14.5 | - | 29.2 | 126 | - | 262 | - | 73.1 | - | 15.6 | 11.1 | - |
| Second-foot-days | | | | | | | | | | | | |
| | 262.03 | 416.36 | 1196.3 | 2375.4 | 4201.5 | 15484 | 3655.7 | 2913.3 | 1470.7 | 702.3 | 399.6 | 242.57 |
| Mean | | | | | | | | | | | | |
| | 8.5 | 13.9 | 38.6 | 76.6 | 150 | 499 | 121.8 | 94 | 49.0 | 22.7 | 12.9 | 8.1 |

amount of water diverted upstream from the gauge into the Happy Valley Irrigation Canal or by other holders of water rights is not known.

**Ground Water**

Two principal ground water areas are located in Shasta County (Rummelsburg and Dietz, 1969). The Modoc Plateau Ground Water Area is located in northeastern Shasta County. The Redding Ground Water Basin is located in south central Shasta

Table 4. Discharge (cfs) data for North Fork of Cottonwood Creek near Misselbeck Dam calculated from discharges in Moon Fork

| Day | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.52 | 14.80 | 39.72 | 37.32 | 142.63 | 1519.62 | 287.93 | 177.29 | 94.51 | 40.52 | 20.26 | 15.20 |
| 2 | 8.52 | 12.88 | 35.06 | 35.86 | 129.57 | 5571.94 | 245.27 | 162.63 | 91.71 | 40.52 | 20.26 | 14.8 |
| 3 | 8.40 | 11.78 | 30.26 | 35.06 | 115.97 | 2819.30 | 218.61 | 155.96 | 91.71 | 38.12 | 19.86 | 14.00 |
| 4 | 8.40 | 11.10 | 28.26 | 35.06 | 119.30 | 1042.41 | 191.95 | 167.96 | 82.25 | 36.52 | 19.33 | 12.50 |
| 5 | 8.40 | 10.64 | 27.06 | 35.06 | 119.30 | 822.46 | 191.95 | 167.96 | 82.25 | 36.52 | 19.33 | 12.50 |
| 6 | 8.52 | 10.26 | 25.19 | 35.06 | 214.61 | 606.52 | 174.62 | 162.63 | 82.25 | 35.86 | 19.33 | 12.50 |
| 7 | 8.77 | 10.13 | 23.46 | 35.06 | 183.95 | 615.85 | 167.96 | 153.30 | 80.91 | 35.06 | 18.80 | 12.14 |
| 8 | 8.64 | 10.13 | 21.86 | 35.86 | 226.61 | 393.24 | 163.96 | 143.96 | 77.18 | 35.86 | 17.86 | 11.78 |
| 9 | 8.64 | 10.77 | 20.79 | 35.06 | 245.27 | 303.92 | 157.29 | 137.30 | 75.85 | 35.86 | 17.86 | 11.78 |
| 10 | 8.40 | 10.38 | 20.26 | 33.72 | 753.27 | 767.93 | 147.96 | 133.17 | 74.65 | 35.86 | 17.86 | 11.10 |
| 11 | 8.28 | 10.13 | 20.79 | 32.93 | 221.28 | 239.94 | 146.63 | 127.83 | 73.45 | 35.06 | 17.46 | 10.77 |
| 12 | 8.16 | 10.13 | 20.79 | 32.93 | 250.60 | 183.95 | 137.30 | 124.37 | 73.45 | 34.39 | 17.46 | 10.77 |
| 13 | 8.16 | 10.13 | 20.39 | 32.26 | 223.94 | 1014.41 | 131.30 | 120.90 | 69.85 | 34.39 | 16.93 | 10.52 |
| 14 | 8.16 | 10.01 | 19.33 | 31.59 | 199.95 | 477.21 | 126.10 | 117.57 | 67.58 | 32.93 | 17.46 | 10.38 |
| 15 | 8.16 | 9.88 | 35.06 | 31.59 | 185.29 | 339.92 | 124.37 | 114.37 | 65.32 | 31.59 | 17.46 | 10.38 |
| 16 | 8.04 | 9.76 | 162.63 | 35.06 | 167.96 | 282.60 | 124.37 | 112.77 | 64.25 | 30.26 | 17.86 | 10.13 |
| 17 | 8.16 | 11.78 | 114.37 | 35.06 | 155.96 | 253.27 | 120.90 | 111.17 | 61.05 | 28.93 | 17.46 | 10.13 |
| 18 | 8.16 | 33.72 | 65.32 | 56.79 | 191.95 | 250.60 | 122.64 | 109.57 | 59.99 | 28.26 | 16.93 | 10.13 |
| 19 | 8.16 | 25.19 | 52.92 | 52.92 | 162.63 | 276.61 | 133.17 | 107.97 | 58.92 | 27.59 | 16.53 | 10.01 |
| 20 | 8.16 | 21.86 | 63.18 | 47.32 | 146.63 | 237.27 | 129.57 | 109.57 | 56.79 | 26.39 | 16.93 | 10.01 |
| 21 | 9.01 | 21.86 | 155.96 | 46.39 | 137.30 | 261.27 | 126.10 | 109.57 | 54.79 | 25.86 | 16.53 | 10.01 |
| 22 | 13.25 | 20.26 | 109.57 | 48.25 | 129.57 | 267.93 | 126.10 | 111.17 | 54.79 | 25.19 | 16.13 | 11.44 |
| 23 | 18.40 | 23.46 | 82.25 | 66.52 | 129.57 | 265.27 | 197.28 | 109.57 | 52.92 | 24.66 | 16.53 | 10.01 |
| 24 | 12.50 | 21.33 | 67.58 | 131.30 | 133.17 | 261.27 | 171.96 | 107.97 | 49.99 | 24.13 | 16.53 | 9.13 |
| 25 | 17.86 | 20.79 | 59.99 | 120.90 | 139.97 | 239.94 | 163.96 | 107.97 | 48.25 | 24.13 | 15.73 | 8.77 |
| 26 | 21.86 | 20.79 | 53.85 | 757.14 | 151.96 | 250.60 | 153.30 | 107.97 | 46.39 | 23.46 | 15.20 | 8.40 |
| 27 | 12.88 | 21.86 | 49.99 | 367.91 | 335.92 | 287.93 | 155.96 | 106.37 | 43.86 | 22.39 | 14.80 | 8.64 |
| 28 | 11.44 | 34.39 | 46.39 | 258.60 | 786.47 | 255.94 | 163.96 | 104.91 | 42.92 | 21.86 | 14.40 | 8.64 |
| 29 | 18.40 | 53.85 | 42.92 | 255.94 | - | 315.92 | 185.29 | 103.31 | 42.12 | 21.86 | 14.40 | 8.40 |
| 30 | 27.59 | 50.92 | 40.52 | 203.95 | - | 415.90 | 185.29 | 98.91 | 40.52 | 21.33 | 14.40 | 8.40 |
| 31 | 19.33 | - | 38.92 | 167.96 | - | 349.25 | - | 97.44 | - | 20.79 | 14.80 | - |
| Second-foot-days | | | | | | | | | | | | |
| | 349.3 | 555.0 | 1594.6 | 3166.4 | 6100.6 | 21190.2 | 4873.1 | 3754.4 | 1960.5 | 936.4 | 532.8 | 323.4 |
| Mean | | | | | | | | | | | | |
| | 11.3 | 18.5 | 51.4 | 102.1 | 217.9 | 683.6 | 162.4 | 121.1 | 65.4 | 30.2 | 17.2 | 10.8 |

County. The western edge of the basin, locally composed of the Tehama Formation, underlies the eastern portion of the Igo-Ono Community Services District roughly bounded to the north by the Happy Valley Irrigation Ditch and to the west by Gas Point Road (Figure 4). Water-bearing sedimentary deposits in the Redding Ground Water Basin are underlain by nonwater-bearing or saltwater-bearing deposits of the Great Valley Sequence, which are on or near the surface in the western edge of the basin.

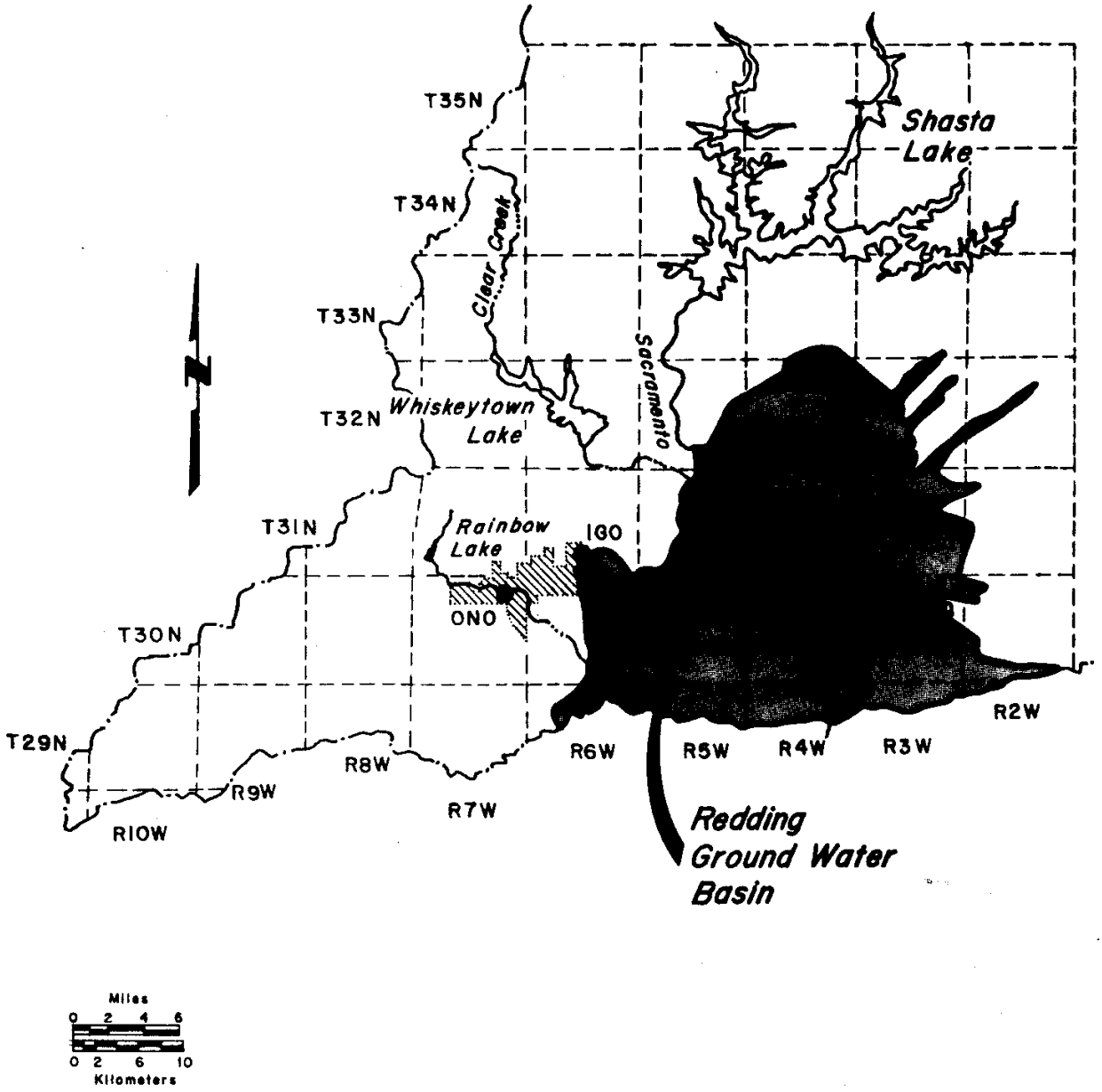



Figure 4. Boundary of the Redding Ground Water Basin.

Other areas in Shasta County may produce ground water depending on local geologic conditions (G. Pearson, DWR, pers. comm.). The Igo-Ono Community Services District outside the Redding Ground Water Basin contains limited amounts of ground water. The quantity produced varies locally depending upon the underground fracture system. Data contained in reports submitted to the Department by drillers for 52 wells in the area indicate that the median well yield is less than one gallon per minute, though some wells yield up to 37 gallons per minute (Table 5). Local residents report having drilled many wells that are dry. In general, ground water availability is negligible.

No documented data are available concerning the quality of ground water in the district. However, residents in the area report concentrations of arsenic and boron in individual wells that exceed safe drinking water criteria.

Data are insufficient to determine the extent of well recharge from canal leakage. Local residents, however, report that wells go dry when the canal is dry. Leakage from the canal may be extensive, with up to half of the total flow lost (M. Trisdale, pers. comm.). Recent evidence indicates unauthorized appropriations may account for some of the losses (L. Preston, pers. comm.). Interception of fracture systems that collect the canal leakage would increase well yield.

**Water Supply**

Misselbeck Dam was originally capable of impounding about 4,300 acre-feet of water without the use of flashboards. Siltation has reduced storage capacity to about 3,600 acre-feet. Restrictions imposed by the Certificate of Approval issued in 1966 limited maximum storage to about 650 acre-feet at gauge 40. Temporary approval for additional storage during the irrigation season was allowed between 1966 and 1981 (Table 6). The current Certificate of Approval, issued in 1981, allows maximum storage of about 1,200 acre-feet at gauge 60 during the irrigation season. The actual amount of water stored since 1981 has ranged from about 3,700 acre-feet in 1983 to 1,400 acre-feet in 1987.

Table 5. Drillers data for wells in the Igo-Ono Community Services District

| Rock Type | No. of Wells | Depth (feet) Median | Depth (feet) Range | Reported Yield (gpm) Median | Reported Yield (gpm) Range | Corrected Yield[1] Median | Corrected Yield[1] Range |
|---|---|---|---|---|---|---|---|
| Wells Above the Happy Valley Ditch | | | | | | | |
| Shasta Bally Batholith | 13 | 145 | 100-250 | 10 | 0-45 | <1 | (0)-7 |
| Wells Below the Happy Valley Ditch | | | | | | | |
| Shasta Bally Batholith | 22 | 184 | 40-342 | 5 | 0-52 | <1 | (0)-14 |
| Undifferentiated Metamorphics | 3 | 47 | 45-375 | 18 | 6-80 | - | - |
| Great Valley Sequence | 13 | 118 | 54-338 | 1.5 | 0-40 | <1 | (0)-37 |
| Tehama Formation | 1 | - | 120 | - | 17 | - | 11 |

[1] Estimated; well storage volume removed to give true yield.

The quantity of water released from the reservoir has been highly variable, ranging from 3,700 acre-feet in 1966 to 250 acre-feet in 1968. Releases for water supply and compliance with end-of-season storage restrictions since 1981 have ranged from 3,250 acre-feet in 1983 to 1,200 acre-feet in 1987.

Appropriative water rights allow the *Igo-Ono Community Services District* to divert a portion of the natural streamflow of the North Fork of Cottonwood Creek through the Hoover Tunnel. The *district* is entitled to divert up to 16.6 cfs during the irrigation season. However, when streamflow is insufficient to meet the 31.3 cfs appropriative rights of all water users, available supplies must be proportioned, except for 4.825 cfs that is not subject to proportionment. The *Igo-Ono Community Services District* is entitled to 60.43 percent of the remaining streamflow in the North Fork of Cottonwood Creek, up to the total diversion of 16.6 cfs.

Table 6. Water storage behind Misselbeck Dam during the irrigation season

| | Allowed Storage | | Actual Storage | | | | |
|---|---|---|---|---|---|---|---|
| | | | Maximum (April) | | Minimum (September) | | |
| Year | Gauge Height | Storage (ac-ft)[1] | Gauge Height | Storage (ac-ft)[1] | Gauge Height | Storage (ac-ft)[1] | Release (ac-ft) |
| 1965 | 86 | 4,000 | 87.0[2] | 4,000 | 74.7 | 3,000 | 1,000 |
| 1966 | 40 | 650 | 87.0[2] | 4,000 | 34.0 | 300 | 3,700 |
| 1967 | 40 | 650 | 52.4 | 1,300 | 35.0 | 350 | 950 |
| 1968 | 40 | 650 | 33.2 | 250 | 21.0 | 0 | 250 |
| 1969 | 80 | 3,500 | 56.0 | 1,500 | 26.5 | 150 | 1,350 |
| 1970 | 40 | 650 | - | - | - | - | - |
| 1971 | 76 | 3,200 | 61.5 | 1,800 | 30.8 | 250 | 1,550 |
| 1972 | 40 | 650 | 40.0 | 650 | 28.4 | 150 | 500 |
| 1973 | 70 | 2,600 | 68.0 | 2,350 | 37.2 | 400 | 1,950 |
| 1974 | 40 | 600 | 86.3[3] | 3,900 | 39.0 | 550 | 3,350 |
| 1975 | 59 | 1,600 | 56.3 | 1,350 | 37.8 | 450 | 900 |
| 1976 | 59 | 1,600 | 61.2 | 1,700 | 40.2 | 600 | 1,100 |
| 1977 | 59 | 1,600 | - | - | - | - | - |
| 1978 | 40 | 400 | - | - | - | - | - |
| 1979 | 40 | 400 | 52.0 | 1,100 | 36.0 | 300 | 800 |
| 1980 | 40 | 400 | 63.0 | 1,750 | 38.0 | 300 | 1,450 |
| 1981 | 60 | 1,600 | 61.4 | 1,650 | 38.0 | 300 | 1,350 |
| 1982 | 40 | 350 | 67.0 | 2,000 | 41.0 | 400 | 1,600 |
| 1983 | 40 | 300 | 84.0 | 3,700 | 43.0 | 450 | 3,250 |
| 1984 | 80 | 3,000 | 80.3 | 3,200 | 40.0 | 200 | 3,000 |
| 1985 | 80 | 3,000 | 67.0 | 1,850 | 42.0 | 250 | 1,600 |
| 1986 | 60 | 1,200 | 64.0 | 1,600 | 41.0 | 100 | 1,500 |
| 1987 | 60 | 1,200 | 62.4 | 1,400 | 44.0 | 200 | 1,200 |

[1] Estimate interpolated from Figure 3
[2] Spillway elevation at gauge 86 per 1971 survey
[3] Spilling over spillway

The limited flow data available for the upper North Fork of Cottonwood Creek indicate that proportionment of supplies should occur in at least some, if not most, years. The available data indicate that only about 14.7, 9.5, 5.7, and 8.9 cfs were available near the end of the irrigation seasons in 1983, 1986, 1987, and 1988, respectively, to water users downstream from Misselbeck Dam and Moon Fork. All water rights not subject to proportionment occur upstream from Moon Fork. Exceptions are diversions of 0.65 cfs, of which the *Igo-Ono Community Services*

*District* is entitled to 0.60 cfs. Assuming that upstream water appropriations were fully used, the *district* would have been able to divert flows of 9.1, 5.9, 3.7, and 5.6 cfs at Hoover Dam near the end of the irrigation seasons in 1983, 1986, 1987, and 1988, respectively (Table 7).

Table 7. Water availability (cfs) in the North Fork of Cottonwood Creek near Hoover Dam

| | 1983 | 1986 | 1987 | 1988 |
|---|---|---|---|---|
| Total flow | 14.7 | 9.5 | 5.7 | 8.9 |
| Non-proportionable water rights | 0.65 | 0.65 | 0.65 | 0.65 |
| Flow subject to proportionment | 14.05 | 8.85 | 5.05 | 8.25 |
| *IOCSD*[1] proportioned right | 8.5 | 5.3 | 3.1 | 5.0 |
| *IOCSD*[1] non-proportionable right | 0.6 | 0.6 | 0.6 | 0.6 |
| Total *IOCSD*[1] right | 9.1 | 5.9 | 3.7 | 5.6 |

[1] *Igo-Ono Community Services District*

The water supply diverted into the Happy Valley Irrigation Canal at Hoover Dam may be augmented by diversion of natural streamflows in Ducket, Doby, Rector, Huling, and Eagle creeks. However, little augmentation is possible by late summer, because flows become very low or nonexistent. Flows found in 1988 would have provided a total augmentation of 1.22 cfs. Estimates of flows in prior years indicate augmentation availability of about 1.5 cfs. Streamflow augmentation of water carried in the canal could, therefore, have increased late summer supplies to 10.6, 7.4, 5.2, and 6.8 cfs in 1983, 1986, 1987, and 1988, respectively.

Leakage from the Happy Valley Irrigation Canal maintains lush stands of riparian vegetation. The canal has been estimated to lose about half of the water supply to leakage and unauthorized appropriations. Assuming that half of any flow in the canal would be lost, the estimated water flow potentially available in the canal in 1983, 1986, 1987, and 1988 would have been 5.3, 3.7, 2.6, and 3.4 cfs, respectively. These late-summer flows would have provided minimum daily water supplies of about 10.6, 7.4, 5.2, and 6.8 acre-feet. However, some customers of the *district* have reported no water in the lower portions of the Happy Valley Irrigation Canal in

some recent years. It is not known whether the potentially available supply was not diverted into the canal or whether heavy use from upstream canal diversions depleted the available supplies.

**Water Use**

The *Igo-Ono Community Services District* does not directly supply water for domestic use. However, water supplied by the *district* is redistributed by the communities of Igo and Ono for domestic use. Most other domestic supplies are obtained from wells or imported as bottled water. Well yield may depend on recharge from leakage of the Happy Valley Irrigation Canal. Some individual residences may also use water from the canal for domestic purposes, with any treatment the responsibility of the user.

Pasture irrigation is the dominant use of water for agriculture in the Igo-Ono Community Services District. Water used for agriculture is supplied by the *district* through the Happy Valley Irrigation Canal or from private wells. Water is also used for landscape and residential garden and orchard maintenance.

Though 2,900 acres in the Igo-Ono Community Services District are considered suitable for crop production, available data indicate only about 381 acres have been irrigated for pasture in recent years (C. Ferchaud, DWR, pers. comm.). Some additional acreage in small increments has been irrigated for landscape, garden, and orchard use. About 1,000 acres had been irrigated in past years when water was more available and dependable (Gelonek, 1968). Property sales, parcel splitting, labor availability and costs, and the economics of raising beef cattle have also influenced the acreage being irrigated.

The 381 acres of irrigated pasture, worth about $10.50 per acre per month for up to a seven-month season (W. Richardson, Tehama County Farm Advisor, Cooperative Extension, U. C. Davis, pers. comm.), had an approximate value of $28,000. Water rates for deliveries by the *Igo-Ono Community Services District* vary with quantity and range from $14.00 per acre-foot for the first quarter acre-foot to $7.00 per acre-foot for deliveries greater than three-quarters of an acre-foot per day (PUC,

1964). Pasture in the Igo-Ono area requires about 3.4 acre-feet of water for irrigation per season (Gelonek, 1968). Water from the *district* to irrigate an acre of pasture, therefore, would cost from $24 to $48 per season. Delivery of water sufficient to irrigate 381 acres of pasture would cost from $9,150 to $18,300, which reduces any income realized from the grazing value of pasture to between $9,700 and $18,850 per year.

Allowed storage has varied considerably since 1981, ranging from 300 to 3,000 acre-feet (Table 6). Actual storage during this period has ranged from 1,400 to 3,700 acre-feet, while downstream releases from the reservoir have ranged from 1,200 to 3,250 acre-feet. Sufficient water has been available from the reservoir to irrigate between 205 and 545 acres at the rate of 3.4 acre-feet of water per acre. This is based on the assumption that half the water transported in the canal is lost to leakage. The 50-percent loss may be an unrealistically high estimate, since reservoir storage available in 1982 was sufficient to irrigate 295 acres at a 50-percent loss rate, while 381 acres of pasture were actually irrigated. Water requirements for domestic needs do not significantly reduce reservoir supplies available for irrigation, since most of the area relies on private wells for domestic supplies.

Reservoir supplies are augmented by natural streamflows. Available data indicate that during 1983, which was an exceptionally wet year, about 5,230 acre-feet were available to the *district* during the irrigation season (Table 8). Assuming half the available water was lost to ditch leakage, thus providing water to wells to satisfy most of the domestic needs in the area, about 2,615 acre-feet would have been available for agricultural use in the Igo-Ono Community Services District. This supply would be sufficient to irrigate about 770 acres of pasture through the irrigation season.

However, the water supply from natural flows in the North Fork of Cottonwood Creek and tributaries is not uniform throughout the irrigation season. The full water right appropriation would only have been met through August 25, 1983, after which date supplies would have been proportioned among all holders of water rights. From May through August 25, about 815 acres could have received water on a schedule that would have applied 3.4 acre-feet of water per acre throughout the

Table 8. Water *(cfs)* available to the *Igo-Ono Community Services District* in 1983 from natural streamflows during the pasture irrigation season

| | May | | June | | July | | August | | September | |
|---|---|---|---|---|---|---|---|---|---|---|
| Day | NFCC[1] | Tribs[2] | NFCC | Tribs | NFCC | Tribs | NFCC | Tribs | NFCC | Tribs |
| 1 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.3 | 1.5 |
| 2 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 15.8 | 1.5 |
| 3 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 15.0 | 1.5 |
| 4 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 13.4 | 1.5 |
| 5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 13.4 | 1.5 |
| 6 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 13.4 | 1.5 |
| 7 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 13.0 | 1.5 |
| 8 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 12.7 | 1.5 |
| 9 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 12.7 | 1.5 |
| 10 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 11.9 | 1.5 |
| 11 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 11.6 | 1.5 |
| 12 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 11.6 | 1.5 |
| 13 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 11.3 | 1.5 |
| 14 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 11.2 | 1.5 |
| 15 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 11.2 | 1.5 |
| 16 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 10.9 | 1.5 |
| 17 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 10.9 | 1.5 |
| 18 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 10.9 | 1.5 |
| 19 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 10.8 | 1.5 |
| 20 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 10.8 | 1.5 |
| 21 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 10.8 | 1.5 |
| 22 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 12.3 | 1.5 |
| 23 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 10.8 | 1.5 |
| 24 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 9.9 | 1.5 |
| 25 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 9.5 | 1.5 |
| 26 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 16.3 | 1.5 | 9.1 | 1.5 |
| 27 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 15.8 | 1.5 | 9.3 | 1.5 |
| 28 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 15.4 | 1.5 | 9.3 | 1.5 |
| 29 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 15.4 | 1.5 | 9.1 | 1.5 |
| 30 | 16.6 | 1.5 | 16.6 | 1.5 | 16.6 | 1.5 | 15.4 | 1.5 | 9.1 | 1.5 |
| 31 | 16.6 | 1.5 | - | - | 16.6 | 1.5 | 15.8 | 1.5 | - | - |
| Second-foot-days | 561.1 | | 543.0 | | 561.1 | | 555.6 | | 393.0 | |
| Mean | 18.1 | | 18.1 | | 18.1 | | 17.9 | | 13.1 | |
| Acre-feet | 1122 | | 1086 | 1122 | 1111 | | 786 | | | |

[1] *North Fork Cottonwood Creek*
[2] *Tributaries;* estimated from late summer observations by M. Trisdale; early summer flows undoubtedly greater.

irrigation season. Water supplies dropped after August 25 due to declining natural streamflows. During the last irrigation cycle covering the final 10 days in September, sufficient water would have been available for only about 514 acres at the same application rate.

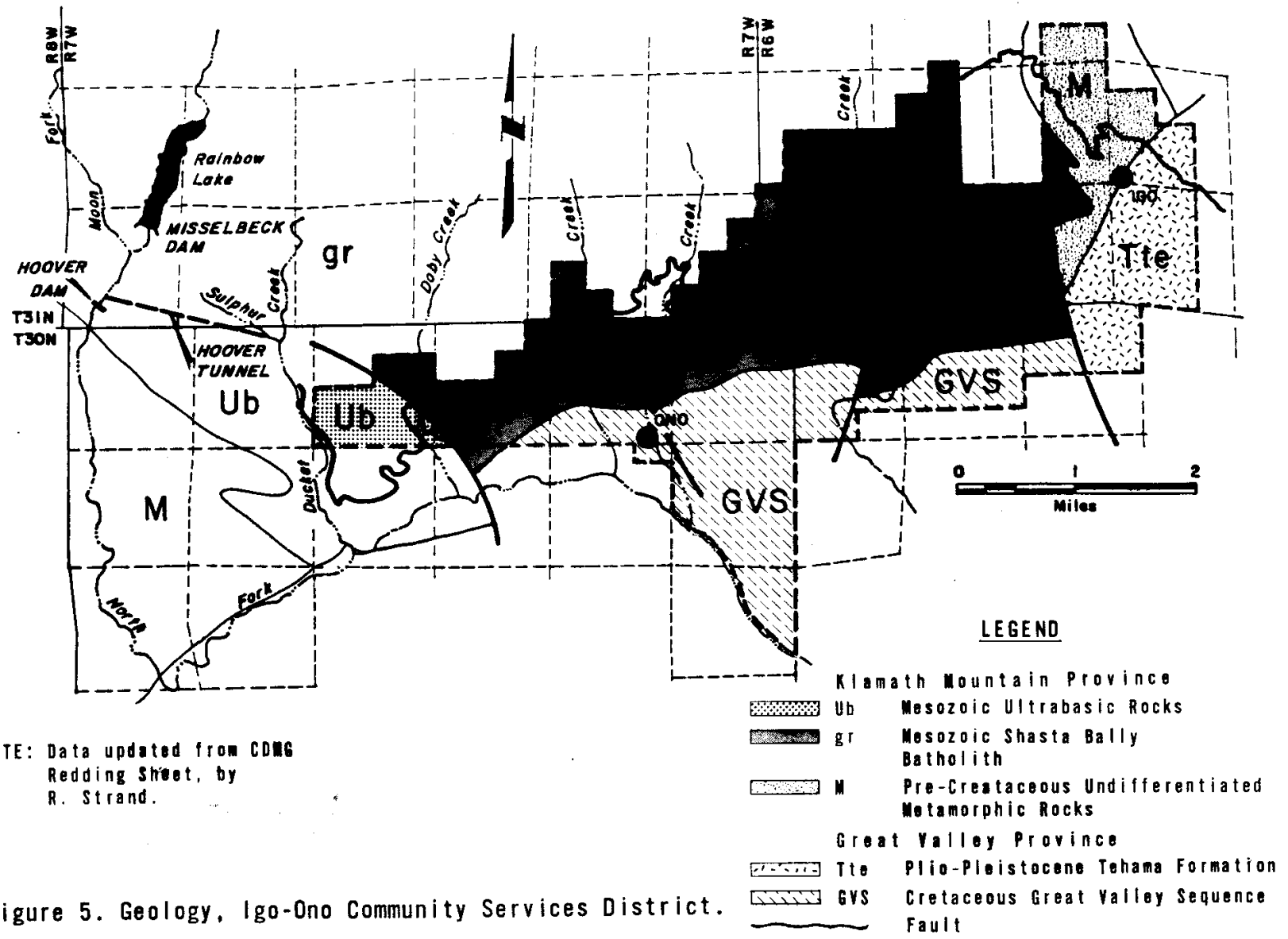
There are no data for other years to determine the availability of water from natural streamflows for the entire irrigation season. The natural flow in streams during late summer in 1986, 1987, and 1988 would have been sufficient to provide season-long irrigation to only about 330, 234, and 306 acres, respectively. Additional acreage could have been initially irrigated at the seasonal water application rate, but water would not have been available during the late summer.

## Geology

Misselbeck Dam and the Igo-Ono Community Services District are near the boundary between the Klamath Mountain and Great Valley Geomorphic Provinces (G. Pearson, pers. comm.). The Klamath Mountain Geomorphic Province covers an elongated, north-trending area in northwestern California and southwestern Oregon. The province includes the eastern portions of Del Norte and Humboldt counties, the western portions of Shasta and Siskiyou counties, and the northern portion of Trinity County. Mesozoic and older igneous and metamorphic rocks predominate in the province. The province is divided into four belts, which include the Western Jurassic belt, the Western Paleozoic and Triassic belt, the Central Metamorphic belt, and the Eastern Klamath belt. Misselbeck Dam and the northwestern two-thirds of the Igo-Ono Community Services District are in the Eastern Klamath belt.

The Great Valley Geomorphic Province covers the Central Valley of California. The province is an elongated structural trough that contains a thick sequence of predominantly Mesozoic and younger sedimentary rocks. The southeastern third of the Igo-Ono Community Services District is in the Great Valley Geomorphic Province.

Five geologic units underlie Misselbeck Dam and the Igo-Ono Community Services District (Figure 5). The Pre-Cretaceous Undifferentiated Metamorphic Rock, Mesozoic Ultrabasic Rock, and Mesozoic Shasta Bally Batholith are in the Klamath Mountain Geomorphic Province. The Cretaceous Great Valley Sequence and the Plio-Pleistocene Tehama Formation are in the Great Valley Geomorphic Province.




NOTE: Data updated from CDMG Redding Sheet, by R. Strand.

Figure 5. Geology, Igo-Ono Community Services District.

The Pre-Cretaceous Undifferentiated Metamorphic Rock unit consists of highly fractured phyllites, meta-cherts, and meta-volcanic rocks. The Mesozoic Ultrabasic Rock unit consists mostly of highly sheared serpentinite and peridotite. The Mesozoic Shasta Bally Batholith, which was intruded near the eastern boundary of the Central Metamorphic belt, is the largest pluton in the Eastern Klamath belt. The batholith is a deep-seated intrusive mass of quartz diorite and granodiorite of Late Jurassic age. The batholith has been exposed by erosion and is deeply weathered throughout the area. Decomposition has resulted in a surface similar to silty sand.

The marine Cretaceous Great Valley Sequence consists of thin to massive well-hardened beds of mudstone, sandstone, and conglomerate. The mudstone beds are lightly fractured and easily eroded. The sandstone and conglomerate beds are moderately fractured and are resistant to erosion.

The Plio-Pleistocene Tehama Formation consists of fluvial deposits of predominantly thick-bedded, poorly sorted, pale-green, gray, or tan-yellow sandy silt and clay. Gravel and sand interbeds are usually thin and lenticular.

**Engineering Geology of Misselbeck Dam**

The diorite of the Mesozoic Shasta Bally Batholith, which forms the foundation of the dam and spillway, is moderately coarse-grained and relatively free from joints and dikes (Marliave, 1941). A thin mantle of soil and organic matter covers the undisturbed areas. The diorite is strongly weathered at the surface, forming loose, granular, coarse sand. Weathering decreases with depth to about 12 feet, below which sound rock prevails.

Overburden was removed from the stream banks and channel during construction of Misselbeck Dam (Riddell, 1920). Core trenches in the abutments were excavated hydraulically to depths of 2 to 5 feet. These trenches were excavated manually an additional 3 feet. The dam was formed hydraulically by sluicing a mixture of decomposed granite, sandy clay, and silt to the dam site, where the coarse soils settled to form the outer shells and the finer materials settled in the core area. Recent analysis showed that at least a portion of the core consists of interlayered

grades of sand and silt ($CH_2M$ Hill, 1986).

The entire spillway was cut in diorite by sluicing decomposed or weathered materials away. Considerable erosion of the diorite has since occurred in the lower spillway from overflows.

**Faults and Seismicity**

*The section "Preliminary Seismic Hazard Evaluation" from the $CH_2M$ Hill, Inc. report "Preliminary Geotechnical Evaluation, Rainbow Lake Dam, Shasta County, California" states: "The immediate area surrounding the project site has an historically low level of seismicity. Large active faults such as the San Andreas (80 miles southwest), Freshwater (60 miles west), and the Gorda Plate Subduction Zone (70 miles west) may potentially have an impact on the project. In addition, currently unrecognized but active faults may be present in the Sacramento Valley or Northern Coast Range. In our opinion, the current state of practice in seismic geology and seismology would support the conclusion that there may be other faults (either unrecognized or with unrecognized activity) with the potential to affect the project through ground shaking. There is simply not enough known about the seismic geology of this area to be positive."*

*The "Fault Rupture Hazard" section of the $CH_2M$ Hill, Inc. report discusses the lack of known occurrence of faults that actually cross the damsite which could rupture and cause direct damage to the structure. The report states "there appears to be no actual hazard from direct fault rupture", but detailed geologic mapping would be necessary for evaluation of this potential. However, the potential still exists for significant damage to the dam from known or unknown faults outside the damsite.*

Knowledge of the seismicity of the Misselbeck Dam area is constantly growing. Early investigators considered the site seismically quiet. Re-evaluation of the original estimates of seismicity has resulted from increasing knowledge of the tectonics of the West Coast. In separate studies, the Division of Safety of Dams and the U. S. Army Corps of Engineers have identified faults that could generate earthquakes of sufficient magnitude to affect Misselbeck Dam (Figure 6 and Table 9).

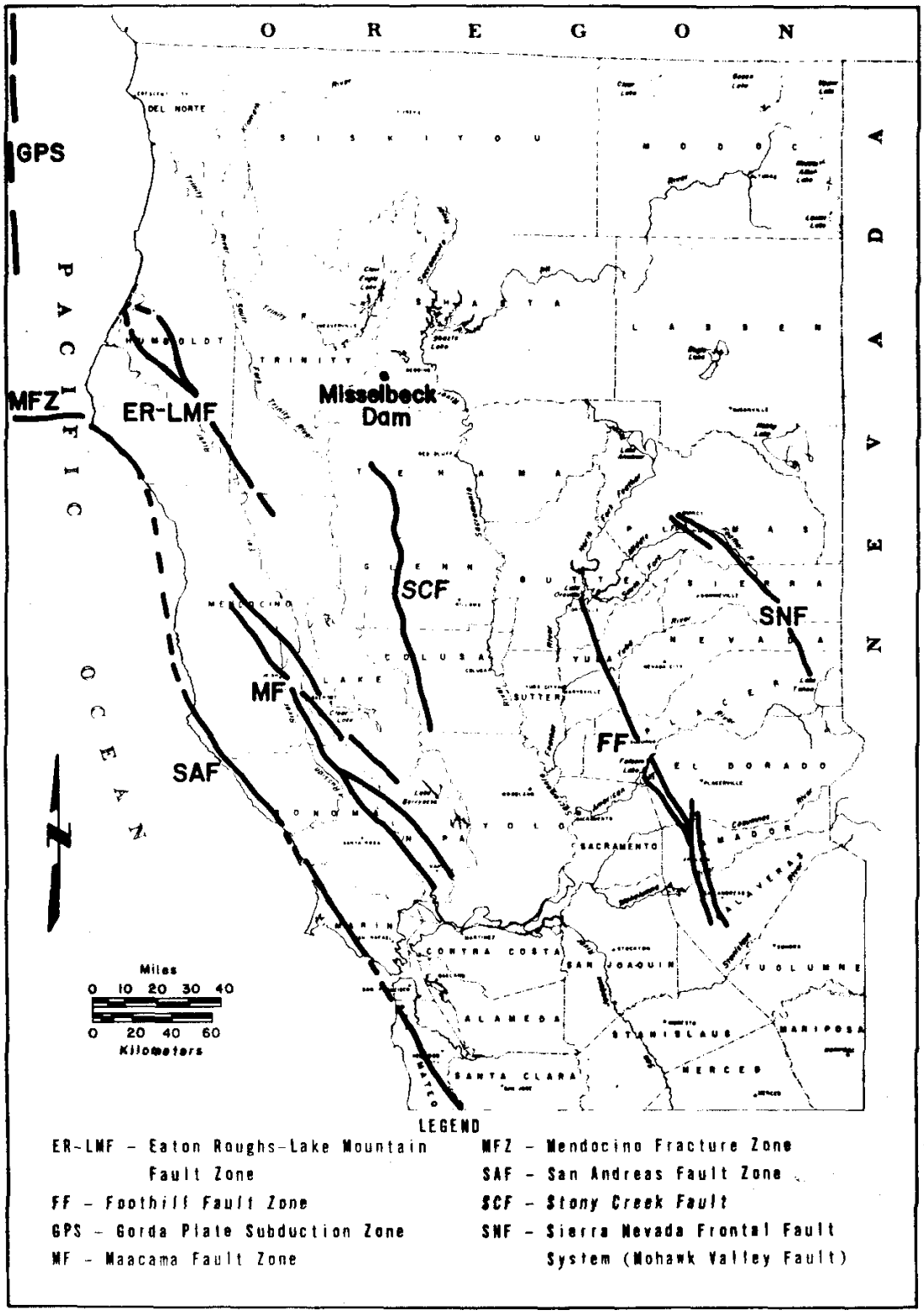



Figure 6. Sources of Seismicity.

Table 9. Earthquake sources near Misselbeck Dam

| Source | Distance From Dam | Peak Bedrock Acceleration | Remarks |
|---|---|---|---|
| Eaton Roughs-Lake Mountain Fault Zone | *78* km | *0.10* g | MCE[1] = 7.5[2] This feature appears to be undergoing strike-slip offset, related to the San Andreas Transform Fault System. |
| Foothill Fault Zone | 61 km | *0.07* g | MCE = 6.5[3] |
| Gorda Plate Subduction Zone | *53* km | *0.24* g | MCE = *7.75* in the vicinity of the dam[2]. The surface of this feature lies beneath the ocean. The feature dips beneath the continent to lie beneath the dam. |
| Maacama Fault Zone | *112* km | 0.06 g | MCE = 7.5[3] |
| Mendocino Fracture Zone | *145* km | *0.04* g | MCE = 7.5[2] |
| San Andreas Fault Zone | *125* km | *0.08* g | MCE = 8.5[3] |
| Stony Creek Fault | 50 km | 0.09 g | MCE = 6.5[3] |

1/ MCE = maximum credible earthquake
2/ Data from Ayers, *1990*
3/ Data from USCE, 1982

**Seismic Stability**

The engineering firm of $CH_2M$ Hill, Inc. conducted a preliminary evaluation based on a single exploratory boring of the embankment forming Misselbeck Dam. *The $CH_2M$ Hill, Inc. report stated that their work did not constitute a complete stability evaluation of the dam due to the limited scope of exploration. The report further stated that additional evaluation was warranted to know with greater certainty if there are stability factors that would jeopardize future use of the dam.* However, the

firm concluded that, if the results of the boring are representative of the general condition of the embankment, there is cause for concern regarding the low relative density of the sands, especially in the top 45 feet of the dam ($CH_2M$ Hill, 1986). Under seismic shaking, such materials may contract and liquefy, allowing slope failure. Analysis indicates that core materials in the dam may be susceptible to liquefaction under fairly low levels of seismic shaking. The $CH_2M$ Hill, Inc. analysis indicated unacceptable safety conditions could be produced at a peak bedrock acceleration (PBA) as low as 0.07g. (PBA is the movement of the rock or foundation expressed as a fraction of gravity.) Most of the faults identified (Table 9) are capable of generating a peak bedrock acceleration in excess of this value. Therefore, the dam is unsafe.

**Vegetation**

Overstory vegetation in the reservoir drainage basin is dominated by ponderosa pine (Pinus ponderosa) occurring in open stands with a few scattered sugar pines (Pinus lambertiana) and black oaks (Quercus kelloggii) (D. Bogener, DWR, pers. comm.). Manzanitas form the dominant understory on drier exposures, with both white-leaf manzanita (Arctostaphylos viscida) and green-leaf manzanita (Arctostaphylos patula) present. Deerbrush (Ceanothus integerrimus), Lemmon ceanothus (Ceanothus lemmonii), and California coffeeberry (Rhamnus californica) are common on less exposed sites. A few scattered willows (Salix sp.) are located within the drawdown zone of the reservoir near the inlet of the North Fork of Cottonwood Creek. Numerous annual grass and forb species are also present along the banks in the drawdown zone.

The upper portion of the Happy Valley Irrigation Canal traverses a vegetative community dominated by ponderosa pine, digger pine (Pinus sabiniana), and black oak, with a moderate to dense brush understory. The lower reaches of the irrigation canal traverse a blue oak (Quercus douglasi) and digger pine community with scattered mature valley oaks (Quercus lobata) on the deeper soils.

The Happy Valley Irrigation Canal supports substantial riparian growth dominated by big-leaf maple (Acer macrophylum), white alder (Alnus rhombifolia), and

willow, with a relatively dense understory of blackberry (Rubus sp.), wild grape (Vitus californica), and scattered clumps of cattail (Typha sp.). The riparian vegetation is both continuous and dense adjacent to the canal. Leakage from the canal also supports locally dense growths of riparian vegetation below the ditch. The numerous seeps along the irrigation canal are marked by succulent grass and forb cover that contrast with the much drier surrounding vegetation. Ground water recharge from the canal may feed many of the seeps and springs which occur regularly below the ditch.

The presence or absence of rare or endangered plant species in the area of the reservoir and irrigation canal was verified from published information (Smith and York, 1984) and a search of the California Natural Diversity Data Base maintained by the Department of Fish and Game (J. Lacey, DWR, pers. comm.). No rare, endangered, or limited distribution plant species are known to occur in the wetland type habitat that could be affected by the proposed project.

**Fish**

Rainbow trout (*Oncorhynchus mykiss*) were stocked in Rainbow Lake by the Department of Fish and Game from 1942 to 1953 (D. Hoopaugh, DFG, pers. comm.). Catfish (Ictalurus sp.) and bluegill (Lepomis macrochirus) were stocked by an unknown person (M. Foster, pers. comm.). A large (7.5 pound) German brown trout (Salmo trutta) was caught from the reservoir by an angler in 1955. No surveys of fish populations in the reservoir have been conducted, but several species common to the North Fork of Cottonwood Creek may be found. These include prickly sculpin (Cottus asper), smallmouth bass (Micropterus dolomieui), green sunfish (Lepomis cyanellus), bluegill, mosquito fish (Gambusia affinis), brown bullhead (Ictalurus nebulosus), Sacramento sucker (Catostomus occidentalis), Sacramento squawfish (Ptychocheilus grandis), hardhead (Mylopharoden conocephalus), California roach (Hesperoleucus symmetricus), carp (Cyprinus carpio), brown trout, and rainbow trout. No rare or endangered species of fish are known to occur in the drainage.

**Wildlife**

Numerous game species occur in the reservoir area, including black-tailed deer (Odocoileus hemionus columbianus), black bear (Euarctos americanus), western gray squirrel (Sciurus griseus), black-tailed jackrabbit (Lepus californicus), California quail (Lophortyx californica), mountain quail (Oreortyx pictus), mourning dove (Zenaida macroura), band-tailed pigeon (Columba fasciata), and wild turkey (Meleagris gallopavo). Lack of emergent vegetation in the reservoir limits waterfowl use to very low levels. No endangered, threatened, or rare species are known to occur within the reservoir area (D. Smith, DFG, pers. comm.).

Vegetative communities such as those traversed by the Happy Valley Irrigation Canal support widely diverse populations of animals (Table 10). However, riparian areas created by leakage from the irrigation canal support disproportionately more wildlife than the surrounding drier areas (D. Bogener, pers. comm.). Most terrestrial vertebrate species found in the area depend directly upon riparian habitat or adjacent aquatic habitat for water, cover, and food. All the upland game birds found in the area, including California quail, mountain quail, mourning dove, band-tailed pigeon, and wild turkey, require watering areas or riparian vegetation as a habitat component throughout the year. All amphibians and many reptiles require water or moist areas for reproduction. Many passerine birds select riparian habitat for nesting or feeding. Riparian habitat becomes seasonally important to other game and nongame species during late summer when water and food sources become depleted.

**Recreation**

Public access to Rainbow Lake is currently prohibited. Past recreational uses of the reservoir included fishing and duck hunting. Some fishing may still occur by owners of private lands surrounding the reservoir and by trespassers, though fishing quality is doubtful considering the low levels of storage in recent years and lack of suitable habitat within the reservoir for many game fish species.

Table 10. Wildlife species potentially occurring in the vicinity of the Happy Valley Irrigation Canal (from Habitat Relationships Computer Model, DFG)

| Common Name | Scientific Name |
|---|---|
| **Amphibians** | |
| pacific giant salamander* | Dicamptodon ensatus |
| rough-skinned newt* | Taricha granulosa |
| California newt* | Taricha torosa |
| ensatina | Ensatina eschscholtzi |
| black salamander | Aneides flavipunctatus |
| western toad* | Bufo boreas |
| Pacific treefrog* | Hyla regilla |
| foothill yellow-legged frog* | Rana boylii |
| bullfrog* | Rana catesbeiana |
| **Reptiles** | |
| western pond turtle* | Clemmys marmorata |
| western fence lizard | Sceloporus occidentalis |
| western skink | Eumeces skiltonianus |
| southern alligator lizard | Gerrhonotus multicarinatus |
| northern alligator lizard | Gerrhonotus coeruleus |
| ringneck snake | Diadophis punctatus |
| sharptailed snake | Contia tenuis |
| racer | Coluber constrictor |
| California whipsnake | Masticophis flagellum |
| gopher snake | Pituophis melanoleucus |
| common kingsnake | Lampropeltis getulus |
| common garter snake | Thamnophis sirtalis |
| western terrestrial garter snake* | Thamnophis elegans |
| western aquatic garter snake* | Thamnophis sirtalis |
| night snake | Hypsiglena torquata |
| western rattlesnake | Crotalus viridis |
| **Birds** | |
| snowy egret* | Egretta thula |
| great blue heron* | Ardea herodias |
| green heron* | Butorides striatus |
| black-crowned night heron* | Nycticorax nycticorax |
| wood duck* | Aix sponsa |
| turkey vulture | Cathartes aura |
| bald eagle | Haliaectus leucocephalus |
| sharp-shinned hawk | Accipiter striatys |
| red-shouldered hawk | Buteo lineatus |
| golden eagle | Aquila chrysaetos |
| American kestrel | Falco sparverius |
| mallard* | Anas platyrhynchos |
| turkey* | Meleagris gallopavo |
| California quail* | Callipepla californica |
| Virginia rail* | Rallus limicola |
| band-tailed pigeon | Columba fasciata |
| mourning dove | Zenaida macroura |
| common barn owl | Tyto alba |

| Common Name | Scientific Name |
|---|---|
| Birds (cont.) | |
| flammulated owl | Otus flammeolus |
| western screech owl | Otus kennicottii |
| great horned owl | Bubo virginianus |
| northern pygmy owl | Gloucidium gnoma |
| long-eared owl | Asio otus |
| Cooper's hawk | Accipiter cooperii |
| northern saw-whet owl | Aegolius acadicus |
| common poorwill | Phalaenoptilus nuttallii |
| Vaux's swift* | Chaetura vauxi |
| common nighthawk* | Chordeiles minor |
| roadrunner | Geococcyx californianus |
| mountain quail* | Oreortyx pictus |
| black-chinned hummingbird | Archilochus alexandri |
| Anna's hummingbird | Calypte anna |
| belted kingfisher | Ceryle alcyon |
| Lewis' woodpecker | Melanerpes lewis |
| acorn woodpecker | Melanerpes formicivorus |
| yellow-bellied sapsucker | Sphyrapicus varius |
| red-breasted sapsucker | Sphyrapicus ruber |
| Nuttall's woodpecker | Picoides nuttallii |
| downy woodpecker | Picoides pubescens |
| hairy woodpecker | Picoides villosus |
| northern flicker | Colaptes auratus |
| western wood-pewee | Contopus sordidulus |
| western flycatcher | Empidonax difficilis |
| Allen's hummingbird | Selasphorus sasin |
| black phoebe* | Sayornis nigricans |
| ash-throated flycatcher | Myiarchus cinerascens |
| purple martin* | Progne subis |
| tree swallow* | Tachycineta bicolor |
| violet-green swallow* | Tachycineta thalassina |
| northern rough-winged swallow* | Stelgidopteryx serripennis |
| Stellar's jay | Cyanocitta stelleri |
| western kingbird | Tyrannus verticalus |
| scrub jay | Aphelocoma coerulescens |
| yellow-billed magpie | Pica nuttalli |
| American crow* | Corvus brachyrhynchos |
| common raven | Corvus corax |
| plain titmouse | Parus inornatus |
| common bushtit | Psaltriparus minimus |
| red-breasted nuthatch | Sitta canadensis |
| white-breasted nuthatch | Sitta carolinensis |
| barn swallow* | Hirundo rustica |
| Bewick's wren | Thryomanes bewickii |
| house wren | Troglodytes aedon |
| long-billed marsh wren | Cistothorus palustris |
| ruby-crowned kinglet | Regulus calendula |
| blue-gray gnatcatcher | Polioptila caerulea |

| Common Name | Scientific Name |
|---|---|
| Birds (cont.) | |
| western bluebird | Sialia mexicana |
| Swainson's thrush | Catharus ustulatus |
| hermit thrush | Catharus guttatus |
| American robin | Turdus migratorius |
| varied thrush | Ixoreus naevius |
| wrentit | Chamaea fasciata |
| cedar waxwing | Bombycilla cedrorum |
| starling | Sturnus vulgaris |
| mockingbird | Mimus polyglottos |
| solitary vireo | Vireo solitarius |
| Hutton's vireo | Vireo huttoni |
| warbling vireo | Vireo gilvus |
| orange-crowned warbler | Vermivora celata |
| Nashville warbler | Vermivora ruficapilla |
| yellow warbler | Dendroica petechia |
| yellow-rumped warbler | Dendroica coronata |
| black-throated gray warbler | Dendroica nigrescens |
| Macgillivray's warbler | Oporornis tolmiei |
| common yellowthroat | Geothlypis trichas |
| Wilson's warbler* | Wilsonia pusilla |
| yellow-breasted chat* | Icteria virens |
| black-headed grosbeak | Pheucticus melanocephalus |
| rufous-sided towhee | Pipilo erythrophthalmus |
| fox sparrow | Passerella iliaca |
| song sparrow | Melospiza melodia |
| white-crowned sparrow | Zonotrichia leucophrys |
| Savannah sparrow | Passerculus sandwichensis |
| golden-crowned sparrow | Zonotrichia atricapilla |
| dark-eyed junco | Junco hyemalis |
| brown-headed cowbird | Molothrus ater |
| red-winged blackbird | Agelaius phoenicens |
| northern oriole | Icterus galbula |
| Brewer's blackbird | Euphagus cyanocephalus |
| house finch | Carpodacus mexicanus |
| lesser goldfinch | Carduelis psaltria |
| American goldfinch | Carduelis tristis |
| house sparrow | Passer domesticus |
| white-tailed kite | Elanus leucurus |
| Mammals | |
| Virginia opossum | Didelphis marsupialis |
| broad-footed mole | Scapanus latimanus |
| Yuma myotis | Myotis yumanensis |
| California myotis | Myotis californicus |
| big brown bat | Eptesicus fuscus |
| red bat | Lasiurus borealis |
| hoary bat | Lasiurus cinereus |
| pallid bat | Antroxous pallidus |
| brush rabbit | Sylvilagus bachmani |

| Common Name | Scientific Name |
|---|---|
| Mammals (cont.) | |
| Sonoma chipmunk | Eutamias sonomae |
| California ground squirrel | Cittelus beecheyi |
| western gray squirrel | Sciurus griseus |
| black-tailed jackrabbit | Lepus californicus |
| western harvest mouse | Reithrodontomys megalotis |
| deer mouse | Peromyscus maniculatus |
| dusky-footed woodrat | Neotoma fuscipes |
| bushy-tailed woodrat | Neotoma cinerea |
| California vole | Microtus californicus |
| creeping vole | Microtus oregoni |
| muskrat* | Ondatra zibethica |
| house mouse | Mus musculus |
| western jumping mouse | Zapus princeps |
| porcupine | Erethizon dorsatum |
| coyote | Canis latrans |
| gray fox | Urocyon cinereoargenteus |
| black bear | Enarctos americanus |
| Botta pocket gopher | Thomomys bottae |
| badger | Taxidea taxus |
| Herrmann kangaroo rat | Dipodomys heermanni |
| ringtail* | Bassariscus astutus |
| raccoon* | Procyon lotor |
| long-tailed weasel | Mustela frenata |
| western spotted skunk | Spilogale putorius |
| striped skunk | Mephitis mephitis |
| mountain lion | Felis concolor |
| bobcat | Lynx rufus |
| wild pig | Sus scrofa |
| black-tailed deer | Odocoileus hemionus |
| *beaver* | *Castor canadensis* |

* Species most likely impacted by project

Game species existing in the upper portion of the North Fork of Cottonwood Creek downstream from Misselbeck Dam include rainbow trout and brown trout (Terry Healy, DF&G, pers. comm.). Appreciable numbers of small smallmouth bass occur near the confluence with the main stem of Cottonwood Creek (Charles Brown,DF&G, pers. comm.). However, limited access and rugged terrain limit opportunities for recreational fishing.

**Fire Protection**

*The Public Resources Code provides fire ratings based on fuels, weather, and topography. The Igo-Ono area south of Platina Road is rated as high fire danger due to hot dry summers, and largely grass covered rolling hills. The area north of Platina Road is rated as very high fire danger due to the steeper topography, and denser growths of brush and trees.*

*Fire protection services are provided to the area by the California Department of Forestry, with fire stations located in Ogo, which is about 8.5 miles southwest of Ono, and in Redding, which is about 16 miles away. Volunteer fire departments provide additional protection, with stations located in both Igo and Ono.*

*The fire history of the Igo-Ono area is one of minimal fire occurrence (Chris Newton, CDF, pers. comm.). Use of water from the ditch for fire protection, therefore, has been minimal. In addition, the Department of Forestry cannot easily refill fire engines or tankers from the ditch due to the shallowness and remoteness of much of the ditch and laterals. Ponds maintained by the ditch may be used for a water supply to fight local fires, but water tankers would usually be available to provide additional water to fire engines. Additional water is available from a water tank located at the intersection of Platina and Cloverdale Roads near Igo.*

**Flood Protection**

Misselbeck Dam modifies surges in winter runoff. Maximum discharge through the two outlet pipes was calculated as about 260 cfs (D. Cahoon, DWR, pers. comm.). Runoff from the drainage basin upstream from the dam in excess of the capacity of the outlet pipes is contained in reservoir storage up to the elevation of the spillway. However, with the limited storage capacity of the reservoir (about 3,600 acre-feet) severe floods are not attenuated. A peak inflow into the reservoir of 3,730 cfs would produce an outflow of about 3,433 cfs for a 100 year event with water at the spillway crest at the beginning of the storm (Marchant, 1989). With a restricted reservoir level, storm attenuation would increase.

**Flood Hazard from Dam Failure**

*The Water Code directs the Department of Water Resources to require owners of unsafe dams to correct deficiencies or remove such dams from service, regardless of the possible extent of downstream damage. Removal of all residences and designation as a flood plain downstream from Misselbeck Dam would not alter the requirement of the Water Code that the Department take action to require either evaluations and repair of the dam, or removal from service.*

Failure of Misselbeck Dam could occur by breaching caused by liquefaction of a portion of the embankment during an earthquake. The mode of failure would depend on the extent of liquefaction. Part of the embankment could slump, releasing enough water to erode the embankment. This would lead to uncontrolled release of stored water and failure of the dam. Liquefaction of the entire embankment might cause an almost instantaneous movement and collapse of embankment fill material and release stored water down the North Fork of Cottonwood Creek (B. J. Smith, DWR, pers. comm.).

Downstream flood damage is dependent upon several factors, including the mode of dam failure, flows in the North Fork and main stem of Cottonwood Creek, and the reservoir stage. A worst-case scenario assumes that dam failure occurs with the reservoir full and relatively high streamflows, and that the *250,000* cubic yards (*155* acre-feet) of embankment and 1,130,000 cubic yards (700 acre-feet) of trapped sediments in the reservoir liquefy during an earthquake, thereby releasing about *7,187,000 cubic yards* (*4,455* acre-feet) of combined sediment and water nearly instantaneously to the North Fork Cottonwood Creek channel. Alternating valleys and narrow canyons downstream from the dam site may modify the floodflow by decreasing the peak flow that would occur at the dam site, but they would also increase the duration of the floodflow. Hoover Dam, which is completely filled with sediments, would probably do nothing to modify a floodflow. The flow could exceed the channel capacity for most or all of the length of the North Fork of Cottonwood Creek, to as far as the confluence with the Middle Fork.

Residences *The area downstream from Misselbeck Dam was surveyed from a helicopter during November, 1989. Three apparently abandoned cabins were identified within two miles of Misselbeck Dam. Two active ranches were identified adjacent to the North Fork of Cottonwood Creek in the narrow canyon within 2.5 miles of the dam. One of the ranches was a house, while the other was a mobile home. Both ranches contained numerous vehicles, outbuildings, and other improvements. A third homesite identified on the most recent U. S. Geological Survey map (1981) was found to be demolished. However, the foundation of a house under construction was found about 3 miles downstream from the dam. While the partially completed residence may be located sufficiently above the streambed to avoid damage from failure of Misselbeck Dam, the other two ranches would definitely be affected. The house is located adjacent to the left (east) bank of the North Fork of Cottonwood Creek, while the mobile home is situated about 100 feet from the creek with an elevation of about 20 to 25 feet above the streambed.*

The only other residence along the North Fork, a ranch on the left bank at the northerly Lower Gas Point Road crossing, is about 16 miles downstream from the dam. The house, barn, equipment sheds, and other buildings are located about 250 feet from the creek, but they are situated on a flat terrace that is apparently an alluvial deposit formed by high flows in the creek. The opposite (right) bank of the creek at this point is a steep bluff that is higher than the ranch buildings. It is probable that this ranch would be seriously damaged or destroyed by the floodflow.

Other residences that might be assumed to be affected by the floodflow are situated a few miles east of the community of Cottonwood, about 30 miles downstream from the dam. Due to the large channel capacity of lower Cottonwood Creek at that point, it is unlikely that floodflow from the failure of Misselbeck Dam would severely damage them or the community of Cottonwood, unless that flow coincided with the peak flow of a large flood in the Cottonwood Creek Basin.

Bridges There are four county road bridges across the North Fork of Cottonwood Creek, two of which could be damaged or destroyed by the floodflow.

The Platina Road bridge crosses the creek about 10 miles downstream from the dam.

This bridge is a modern steel and concrete structure, with the deck about 80 feet above the stream channel. It is considered unlikely that the floodflow would affect this structure.

The northerly Lower Gas Point Road bridge crosses the creek about 16 miles downstream from the dam. This is an older steel truss bridge with a span of about 100 feet. The bottom of the truss is about 12 to 15 feet above the stream channel. It is considered probable that this bridge would be damaged or destroyed by the floodflow. Replacement was estimated in 1985 to cost $256,000 (G. Gordon, Shasta County Public Works Department, pers. comm.).

The southerly Lower Gas Point Road bridge crosses the creek about 18 miles downstream from the dam. This is also an older steel truss bridge, with two spans of about 100 feet each. The easterly span is about 25 feet above the stream channel. Gravel deposits under the westerly span reduce the clearance to 12 to 15 feet. It is possible that this bridge could be damaged or destroyed by the floodflow. Costs estimated in 1985 to replace the bridge are $500,000 (G. Gordon, pers. comm.).

The McAuliffe Road bridge crosses the creek about 19 miles downstream from the dam. This bridge is a modern concrete structure with four spans of about 50 feet each. The bridge deck is about 20 feet above the stream channel at the east end and rises about 10 feet in elevation to the west end of the bridge. The roadway appears to be lower in elevation than the bridge deck for about 100 feet east of the bridge, providing an overflow area for high flows. It is considered unlikely that this bridge would be affected by the floodflow, but the roadway to the east might be overtopped and washed out.

Other bridges (Interstate 5, Southern Pacific Railroad, and old Highway 99) cross Cottonwood Creek at Cottonwood, about 30 miles downstream from the dam. It is considered unlikely that the floodflow would affect these bridges, unless that flow coincided with the peak flow of a large flood in the Cottonwood Creek Basin.

Sedimentation The failure of Misselbeck Dam would release about 1.9 million cubic yards of silt and sand into the channel of the North Fork of Cottonwood Creek.

Portions of this sediment would be deposited along the stream banks as the floodflow receded, and portions would be deposited in the stream channel of the lower creek, where the thalweg slope is less and the sediment-carrying capacity of the floodflow would be reduced. It would take a number of years for all this sediment to be transported down Cottonwood Creek and into the Sacramento River, depending upon the magnitude and frequency of high flows in the basin. A portion of this sediment would be trapped and removed from the creek by gravel extraction operations at Cottonwood. The major impact of this sediment would be the clogging of spawning gravels for anadromous fish in lower Cottonwood Creek and the Sacramento River.

Other People exposed to the floodflow through activities in the floodplain would risk injury or loss of life. Travelers using roads and bridges, recreationists, and workers in the floodplain would be at risk. The number of people at risk is highly variable, depending on traveling patterns, recreational opportunities at various times of the year, and worker requirements for activities on lands affected by the floodflow.

Farm, ranch, and industrial operations in the floodplain would also suffer from economic losses. Floodflows would destroy planted crops or orchards, or degrade farmland quality through erosion during the flood peak or deposition of sediments as the floodflow receded. Livestock maintained on lands in the floodplain would be injured or lost. Fences, irrigation systems, and equipment would be damaged or lost. Since land use varies with time of year, such as winter range for cattle grazing or summer farming of crops, losses would depend on the time of year in which failure occurred. Gravel operations at Cottonwood would also be affected through loss of lives or equipment.

## SIGNIFICANT ENVIRONMENTAL EFFECTS

Revocation of the Certificate of Approval for Misselbeck Dam would prohibit storage of water. The loss of stored water during years of normal runoff would not significantly affect the ability of the *Igo-Ono Community Services District* to supply water in quantities that *have been* delivered since 1982 to customers. A maximum

of 600 acre-feet was delivered in 1984, while water supply data conservatively indicate at least 800 acre-feet were available from natural streamflows throughout the irrigation season during a year of less than normal runoff. However, data are not available to determine water supplies available from streamflows unaugmented by reservoir storage during severe drought or consecutively dry years. Loss of stored water in dry years may significantly affect the ability of the *district* to meet existing supply requirements, adversely affecting domestic and agricultural users, wildlife, and fire protection capabilities.

Prohibition of storage behind Misselbeck Dam would require extensive structural modification. This would eliminate the current certified storage of 1,200 acre-feet. This loss would significantly affect future growth in the area. The manner in which the dam was altered to preclude impoundment may also produce environmental effects.

**Domestic Use**

Most domestic water in the Igo-Ono Community Services District is obtained from wells, springs, or bottled water. Sixteen residences at Ono and six residences at Igo, as well as a few scattered residences in the district, rely directly on the Happy Valley Irrigation Canal for domestic water. However, many wells and springs are recharged by leakage from the canal and thus rely indirectly on the canal for domestic water.

Water requirements for domestic supply may be determined by assuming an average annual demand of 150 gallons per capita per day, a maximum daily demand of three times the average annual demand, and a maximum hourly demand of six times the average annual demand (SCDWR, 1965). The maximum daily demand is thus 450 gallons per day (gpd) or 0.31 gallon per minute (gpm) per capita, and the maximum hourly demand is 900 gpd or 0.63 gpm per capita. The approximately 400 residents in the district would produce a total maximum hourly demand of 250 gpm, which would require a continuous flow of 0.6 cfs.

The estimated water supply available for diversion from natural flows in the North

Fork of Cottonwood Creek during late summer in 1983, 1986, 1987, and 1988 would have been more than sufficient to satisfy the water demand for domestic use. Loss of half the total available supply to canal leakage would still have provided ample domestic supplies in the canal because most residences rely on ground water recharged from canal leakage rather than direct diversion from the canal.

Data are not available to determine the availability of water from natural streamflows during drought years. Additional water supplies, such as from reservoir storage, may be needed during exceptionally dry years to provide water for domestic use. Recharge to the ground water supply may not be sufficient at low flows in the canal to meet pumping requirements for domestic needs and other uses, including agriculture and stock watering. In addition, operating the present distribution system to maintain the uniform flow needed to meet domestic demand would be extremely difficult, if not impossible, in a dry year.

**Agricultural Use**

Augmentation of natural streamflows with stored water is necessary to provide full irrigation throughout the irrigation season and dependable minimum supplies to balance natural streamflow fluctuations from year to year. Loss of storage behind Misselbeck Dam would result in undependable annual water supplies that could fluctuate significantly from year to year. The extent of pasture development would depend on water available during low flow years, since development undertaken when supplies were more abundant could be lost during a dry year. Although some pasture may be developed beyond that which dry year flows could support, higher value crops would probably not be developed since greater monetary losses would be sustained in a dry year. Full storage behind Misselbeck Dam would provide about 3,600 acre-feet of water, which would be sufficient to irrigate about 530 acres of pasture, in addition to that supported by natural streamflows. At the current restricted storage of 1,200 acre-feet, about 180 acres could be supported. The availability of dependable and adequate water supplies would likely result in production of higher valued crops, such as orchards, which would not occur without storage.

**Wildlife**

Prohibition of water storage behind Misselbeck Dam would eliminate the reservoir habitat used by fish and wildlife. However, losses of fish and wildlife dependent on the reservoir would probably not be significant. Reservoir storage in past years, and most recently in 1986 and 1987, has been depleted during the summer. The loss of reservoir habitat during these years would have eliminated any fish or wildlife species strictly dependent upon it. The natural flow of the North Fork of Cottonwood Creek would be unaffected by the prohibition of storage and would continue to provide habitat during the summer for fish and wildlife as has occurred in past years following depletion of reservoir storage. However, prohibition of storage could affect species seasonally dependent upon reservoir habitat, such as migratory waterfowl. Little use of the reservoir by such species, though, has been reported in past years.

Leakage of water diverted to the Happy Valley Irrigation Canal from the natural flow of the North Fork of Cottonwood Creek and other tributaries would continue to support riparian habitat important for a variety of wildlife species. However, some riparian habitat may be lost because natural streamflow would be insufficient to maintain flow the entire length of the canal during late summer in some years. This loss would displace dependent wildlife species (Table 10) to other suitable habitat. Competition for limited resources would eventually cause loss of displaced wildlife.

A diminished water supply would also reduce irrigated pasture, causing the loss of seasonally important wildlife forage habitat. Game species affected include black-tailed deer, feral pigs, turkeys, and black bear.

**Fire Protection**

*The presence or absence of Misselbeck Dam does not affect the fire rating of the area. The main effect from loss of water storage behind Misselbeck Dam would be the loss of a helicopter reloading area from the reservoir for fire control in the Bully Choop area to the northwest (Chris Newton, pers. comm.).*

*The Department of Forestry cannot easily refill fire engines or water tankers from the canal due to the shallowness and remoteness of much of the canal and laterals. Water held in ponds, which may be supplied by the canal, are valuable, however, for refilling of water by fire suppression equipment. Water would probably be available in the canal for filling of ponds throughout the summer during years of normal runoff. During drought years, however, water may not be available in sufficient quantity to maintain water in ponds throughout the service area, resulting in fewer sites for reloading with water of fire suppression equipment. General fire conditions can be expected to be most severe during drought years, which increases the value of stored water to maintain flow in the canal and filling of local ponds. Fire suppression equipment may have to travel greater distances during drought years to reload with water, which may decrease the ability to suppress fires. However, water tankers and a water tank about 2 miles south of Igo are available for refilling of fire suppression equipment even during drought years.*

**Sedimentation**

Prohibition of storage would require virtually unimpeded flow of the North Fork of Cottonwood Creek through the present reservoir area. The reservoir presently functions as a sediment retention trap, *although prior to about 1969 winter flows were not impounded allowing sediment carried with winter high flows to pass through the reservoir area.* About 700 acre-feet of sediment has been retained since construction in 1920, while an unknown quantity has been flushed downstream. The rate of sediment accumulation and the amount of sediment that leaves are both unknown. More sediment would be carried downstream if the reservoir was removed from service *or returned to the operation schedule that existed prior to 1969.*

Sediment deposition in the North Fork of Cottonwood Creek downstream from Misselbeck Dam would not likely increase significantly if sediment transport increased. The relatively narrow channel creates hydraulic conditions that flush most sediments. Hydraulic conditions in the main stem of Cottonwood Creek would, however, allow sediment to be deposited. Increased deposition would not significantly impact aquatic habitat in the main stem of Cottonwood Creek since

present sedimentation is significant (K. Buer, DWR, pers. comm.). Hydraulics in the Sacramento River would prevent deposition of sediments in important aquatic habitat, but sediments contributed by Cottonwood Creek would be deposited on floodplains and high terraces.

The potential for catastrophic failure of the dam embankment and subsequent mass downstream movement of fill materials and stored sediments would be greatly reduced by the prohibition of water storage. Embankment failure could still occur during an earthquake, allowing downstream sedimentation as the fill materials and reservoir sediment are eroded by natural surface runoff.

**Economy**

The lack of a dependable water supply has limited *the* economic development in the Igo-Ono area. While some businesses in Igo and Ono primarily serve the nearby areas, most revenues are generated by commuters to neighboring communities, such as Redding and Anderson. Retired residents are another source of revenue. *Hunters pursuing abundant game species in the area may provide some additional revenue to local retailers and services. Some loss of revenue to local services may occur from hunters attracted to other areas if populations of game species become significantly reduced.*

The natural flow of the North Fork of Cottonwood Creek and tributaries diverted into the Happy Valley Irrigation Canal would have provided sufficient water to satisfy present domestic requirements, either through direct use or ground water recharge, during 1983, 1986, 1987, and 1988. Data are insufficient to indicate whether similar water supplies would be available during other years, especially such drought years as 1976 and 1977. Decrease in natural streamflows below the level required to provide direct use and ground water recharge would impose a severe hardship on residents, who would then have to haul water and make provisions for individual storage.

The lack of a dependable domestic water supply may also adversely affect property values, although losses from depreciation of property values would not affect

residents until a property was sold. However, the Igo-Ono area has historically experienced water supply shortages. Residents purchasing property in the area have accepted shortages as part of the inconvenience of rural living, but dependable water supplies are much desired. Property values, therefore, might not drop significantly. *Loss of property value may result in reduced property tax income for local taxing jurisdictions. Some residents may leave the area due to the lack of a dependable water supply. The loss of these residents may result in some loss of enrollment, and thus funds, in the Igo-Ono-Platina Union School District.*

Many landowners use irrigated pasture to support horses for recreation and to raise a few head of cattle or sheep for personal consumption. Some larger landholdings are used commercially for cattle grazing, but present water shortages generally preclude use throughout the summer.

Historically, as much as 1,000 acres of pasture were irrigated when more water was available from Misselbeck Dam. Storage limitations beginning in 1966 and undependable natural streamflows reduced irrigation to only 381 acres by 1982. Dependence on natural streamflows alone in future years would probably further reduce irrigated acreage. The amount of water available during years of low flow would probably set the limit, since acreage developed during years of more abundant flow would be lost when water supplies diminished during dry years. *Water has been delivered to customers in recent years sufficient* to fully irrigate only about 160 acres. However, some of the 550 acre-foot average delivery in recent years is used domestically, reducing the amount for irrigation.

Lack of canal maintenance has contributed to the reduction of water availability, with up to half of the transported water currently lost to leakage or unauthorized appropriation. Potential water availability has been further reduced by about 700 acre-feet due to sediment accumulation behind Misselbeck Dam. Though sufficient water may have been available in some years to irrigate 1,000 acres, the present certified storage of about 1,200 acre-feet and losses due to evaporation and transport severely reduce the acreage that can be irrigated.

Prohibition of storage behind Misselbeck Dam would eliminate the current

potential water yield of 1,200 acre-feet. This would be sufficient to irrigate about 180 acres of pasture at 3.4 acre-feet of water per acre, *assuming* loss of half the supply to leakage. The loss of reservoir yield would inhibit pasture development. Use of the entire potential water supply for pasture development would be worth approximately $13,230 per year at $10.50 per acre per month for a seven-month season. Additional economic losses may result from lowered property values.

The *Igo-Ono Community Services District, based on charges of the previous owner ranging* from $7 to $14 per acre-foot of water depending on the delivery rate, could derive from $8,400 to $16,800 per year in income from use of certified reservoir storage. *The Igo-Ono Community Services District currently derives revenue of about $14,000 to $16,000 annually, but expenses nearly equal income (Jerry Vossen, Chairman, Igo-Ono Community Services District, pers. comm.). The district also has an annual payment of $5,000 for a period of ten years for purchase of the water system. Reduced water supplies that would result from prohibition of storage would reduce potential income for the Igo-Ono Community Services District, and may affect the district's ability to pay expenses.*

## REVOCATION COMPLIANCE

If the Department of Water Resources revokes the Certificate of Approval, the *Igo-Ono Community Services District* would be responsible for modifying Misselbeck Dam so that no water could become stored. Modifications to comply with the revocation would require prior approval by the Division of Safety of Dams.

The *Igo-Ono Community Services District* could not simply maintain the outlet valves in the fully open position to allow unimpeded flow of the North Fork of Cottonwood Creek. Since the capacity of the outlet pipes is insufficient to pass flows associated with winter storms, water would be stored and may overflow the spillway.

Similarly, the capacity of the outlet facilities may be enlarged to pass winter streamflows. The outlet pipes could be removed and the tunnel bulkhead modified to allow unimpeded flow through the outlet tunnel, which has a flow capacity of

approximately 900 cfs (D. Slebodnick, DWR, pers. comm.). Though the ability to pass high streamflows would be enhanced by modification of the outlet facilities, major winter storms could produce streamflows beyond the capacity of the outlet tunnel, causing water to become stored behind the dam. The outlet tunnel may also become clogged by debris from the logged watershed, thereby reducing the ability to pass winter flows.

The *Igo-Ono Community Services District* could breach the dam embankment by hauling embankment fill and stored sediments to a suitable disposal area. Environmental effects would resemble those normally associated with construction activities, including increased traffic, noise, dust, and equipment emissions, but little downstream impact should occur. The reservoir area would require revegetation to reduce erosion. Downstream transport of sediments from the upper watershed would increase from removal of the dam which acts as a sediment trap. Sediment deposition patterns in downstream channels should not change. *Removal, transport, and storage of embankment fill (250,000 cubic yards) and deposited sediments (1,130,000 cubic yards) would cost $1,250,000 and $5,650,000, respectively, estimated at $5 per cubic yard, for a total of $6,900,000.*

The entire dam and stored sediments, however, may not need to be removed. The crest of the dam could be lowered to the sediment storage elevation, which is currently about 40 feet above the streambed. The remaining embankment would have to store *not more* than 15 acre-feet of water to no longer be considered a dam. Embankment fill above the 40-foot elevation could be hauled to a disposal area, but at substantial cost, or spread over the current sediment deposits at relatively little cost. The remaining dam embankment would require protection from erosion, which could be achieved with a concrete cap or other means. Revegetation of the sediments would decrease scour from high flows as well as increase wildlife habitat and improve aesthetics. The channel through the deposited sediment may have to be stabilized to prevent erosion. Sediments produced from the upper watershed would be transported to downstream areas, but deposition patterns should not change. The remaining dam embankment and reservoir sediment would remain saturated. Liquefaction may cause these soils to flow into the North Fork of *Cottonwood Creek*. Drainage of the sediments may be enhanced to reduce

liquefaction potential using the outlet tunnel and drain material.

The spillway could be lowered to the sediment storage elevation, leaving the main embankment undisturbed. *The resulting storage capacity would have to be not more* than 15 acre-feet of water. Material removed from the spillway area could be hauled to a disposal area or spread over current sediment deposits behind the dam. The spillway may require enlargement to safely pass an appropriate flood. The integrity of natural material beneath the altered spillway would require evaluation to determine susceptibility to erosion, and may require capping with concrete. Reduction of scour of stored sediments and improvement for wildlife habitat and aesthetics could be achieved through revegetation. Channel stabilization through deposited sediments would reduce erosion. No significant effects to downstream areas are expected from the movement of sediments eroded from the upper watershed. Damage due to liquefaction would be similar to the last alternative. Enhanced drainage to reduce liquefaction potential may also be achieved using the outlet tunnel and drain material.

## UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS

Revocation of the Certificate of Approval for Misselbeck Dam would cause significant environmental effects that could not be avoided. Prohibition of water storage would significantly reduce the water supply available for domestic use, agriculture, fire protection, and wildlife. This might subsequently lower property values and affect economic development in the area. Costs for development of alternative water supplies could also raise utility bills for residents.

## MITIGATION MEASURES TO MINIMIZE THE SIGNIFICANT EFFECTS

The Department of Water Resources proposes the revocation of the Certificate of Approval for Misselbeck Dam. Mitigation for any loss of water supply is the responsibility of the *Igo-Ono Community Services District*, operating under a certificate of public convenience and necessity for public utility water service. Several courses could be followed to mitigate the significant effects caused by the revocation of the Certificate of Approval to store water behind Misselbeck Dam.

*Loan and grant programs are available through the State and federal governments to assist communities experiencing water supply problems to rehabilitate current facilities or develop alternate facilities.*

**Rehabilitation of Misselbeck Dam**

A new Certificate of Approval could be issued that allows up to full use of storage potential. However, for continued operation or an increase in certified storage, an engineering evaluation of structural deficiencies would be necessary, followed by submission of plans for remedial work for approval by the Division of Safety of Dams, and satisfactory completion of repairs. Specific remedial actions currently deemed necessary include a complete seismic evaluation of embankment stability followed by any necessary rehabilitation, spillway realignment and rehabilitation, outlet pipe modification, and embankment erosion control. The engineering firm of $CH_2M$ Hill, Inc. in 1986 estimated that the costs would exceed $150,000 for thorough embankment stability analyses ($CH_2M$ Hill, 1986). Rehabilitation of the embankments would be necessary if the stability analyses indicated structural deficiencies. The costs for rehabilitation cannot be estimated until the stability analyses are complete and the extent of deficiencies are known. Rehabilitation costs of the spillway, outlet pipes, and embankment facing were estimated by $CH_2M$ Hill, Inc. in 1980 to be $1,175,000. Present costs would be somewhat higher due to inflation. Sedimentation would continue to reduce storage capacity.

Several alternatives are available for rehabilitation of the dam embankment. Analyses of other embankment dams have shown that placing a berm on the existing embankment might increase the dynamic strength of the existing embankment soils (W. Bennett, pers. comm.). The berm, or ballast fill, could be placed on the upstream slope, crest, or downstream slope of the dam, depending upon the outcome of the dynamic analysis.

The overburden on liquefiable zones within the dam might be increased, thereby increasing the dynamic strength of those zones, by lowering the spillway crest, hence the water surface level in the reservoir, and retaining the configuration of the existing dam. The size of the saturated zone within the embankment might also be

reduced significantly. The extent to which the reservoir could be lowered would be determined from a dynamic analysis.

Some sandy soils can be densified in place with the use of a large, crane-held, vibrating probe. Increased density increases the dynamic strength of the embankment soils. This vibra-floatation process does not work with all soil types, however, and may be limited in its effectiveness. Vibra-floatation along slopes might not be practical.

Dynamic compaction, in which large weights are dropped from a crane on soils while adequate drainage is provided, has been known to densify and strengthen some soil deposits. Satisfactory performance has been obtained with deposits that are from 10 to 20 feet thick.

Soils cannot liquefy without saturation. Reducing or eliminating the saturated soil in some parts of the embankment with a membrane or slurry trench might improve the seismic stability of the embankment. However, this technique could have limited application in a hydraulic fill dam.

Techniques to reduce or prevent pore pressures within a soil deposit during earthquake shaking have been useful in some instances. Sand drains, which are holes drilled into the liquefiable material and backfilled with very permeable sand or gravel, have been used. If the soil deposit is not sizeable, earthquake water pressures are alleviated by the drains, thus strengthening the existing deposit.

Other methods for possible rehabilitation of the dam embankment may exist. All alternatives would require engineering analysis and design to determine their applicability to Misselbeck Dam.

**New Dam**

*Several possible sites exist that could be developed for water storage should Misselbeck Dam be removed from service. The cost for these alternative water supply sources would be high, resulting in more expensive water than residents in*

*the district are currently using. However, cost sharing for an alternative water supply may be feasible with other water districts seeking additional supplies. Additionally, low interest loan and grant programs would help reduce the cost for development of alternative water supplies.*

Construction of a new dam could provide all or a portion of the water supply originally available from Misselbeck Dam. Potential dam sites exist on the North Fork of Cottonwood Creek, the South Fork of Clear Creek, and Doby Creek. Three possible sites for a new dam on the North Fork of Cottonwood Creek include the site of the existing dam, downstream near Hoover Dam, and immediately upstream from the existing dam. Complete reconstruction of the existing dam could use existing fill materials, thereby greatly reducing costs for borrow areas and transportation. Other costs generally associated with dam construction, such as land acquisition, would also be substantially reduced at the existing site. The dam could be reconstructed to present storage capabilities of 3,600 acre-feet or to a smaller size. Gradual storage reduction due to sedimentation would continue to be a problem.

The narrow canyon near Hoover Dam may support construction of a dam with a storage capacity of about 20,000 acre-feet. Fill materials and deposited sediments at the existing dam should be sufficient for embankment construction. The dam, located a short distance upstream from Hoover Dam, would allow use of current water district facilities while greatly expanding the water supply. Costs for transportation and land acquisition should not be excessive, since the potential dam site is less than a mile from the source of fill material in a remote area. Sedimentation would reduce storage over time, but may not be significant in relation to the water yield.

The Department of Water Resources in 1964 identified a potential reservoir site on the North Fork of Cottonwood Creek about 1.5 miles upstream from Misselbeck Dam (DWR, 1964d). A dam containing 3.5 million cubic yards of fill would create Shoemaker Reservoir with a storage capacity of 7,000 acre-feet. About half the required fill could be obtained from the embankments forming Misselbeck Dam and stored sediments. Borrow areas would have to be located for about 1.6 million cubic yards of fill. Costs for Shoemaker Reservoir would probably be greater than for the

other two alternative dams on the North Fork of Cottonwood Creek. Reduction of storage area by sedimentation would reduce water yield over time.

The Department of Water Resources in 1964 also identified a potential reservoir site on the South Fork of Clear Creek about 1 mile northwest of Igo (1964d). The potential reservoir, Petty Butte Reservoir, would store about 2,400 acre-feet behind a 100 foot high dam. However, water would have to be pumped to the Igo-Ono Community Services District since the stream bed elevation at the dam site is about 80 feet lower than the Happy Valley Irrigation Canal. In addition, only the Igo area would be served, unless the entire canal upstream from Igo was realigned to allow gravity diversion from the reservoir. Water supply development from the Petty Butte Reservoir would probably be prohibitively expensive considering borrow area sources, land acquisition, and extensive relocation of present facilities.

A potential dam site was located on Doby Creek about 0.25 mile upstream from the Happy Valley Irrigation Canal (B. J. Smith and K. Buer, DWR, pers. comm.). A 65 to 70 foot high earthfill dam could impound a reservoir of about 1,700 to 2,000 acre-feet. The dam would require about 250,000 cubic yards of fill, which might be obtainable from within the reservoir area. Water diverted primarily during the winter and spring from the North Fork of Cottonwood Creek would flow into the reservoir through the present alignment of the canal. Water released from the reservoir would flow about 0.25 mile in Doby Creek to a current diversion into the canal. In addition to costs for construction of the dam, about 1 mile of the Rainbow Lake Road would require relocation and land encompassing several homesites would have to be acquired.

**Distribution System**

Present use of the Happy Valley Irrigation Canal for distribution of domestic and agricultural water supplies is inefficient. Both canal leakage and unauthorized appropriations contribute to loss of up to half the available water supply. The distribution efficiency of the canal could be improved by regular maintenance. A minimum maintenance program would include elimination of unauthorized diversions and repair or sealing of areas in which leakage is clearly excessive. A

more ambitious approach would involve lining the entire canal. However, while greatly extending the supply of water available for domestic and agricultural use, such an approach would eliminate riparian vegetation and associated wildlife and might cause many private wells to become dry. The distribution system from the canal could be expanded to provide water to individual residences whose wells had been dependent on canal leakage. This arrangement would allow the *Igo-Ono Community Services District* to receive proper compensation from all users dependent on water supplied by the *district*.

High water delivery efficiency could be achieved by plumbing the entire distribution system beginning at Hoover Tunnel. Pipe of sufficient size to carry required water quantities could be laid in the existing canal with laterals to individual residences. The system could be designed to deliver natural streamflows in excess of system requirements into the canal for ground water recharge and maintenance of riparian areas. However, during the later summer of dry years, natural flows in the North Fork of Cottonwood Creek might not be sufficient to maintain both the water distribution system and water in the canal. Water transported in the piped system would be regulated by requirements of the California Department of Health Services for domestic supplies (CDHS, 1977). Regular testing and treatment to meet water quality specifications would be required. Monitoring and treatment costs would make the piped water too expensive for agriculture. Except at Igo and Ono, the remoteness of individual residences would drive up construction costs for the piped water distribution system. In addition, operation as a domestic supplier might not provide sufficient revenues for the *Igo-Ono Community Services District* to cover operational expenses.

Provisions were made during construction of the Muletown Conduit in 1966 for a turnout to provide 0.5 cfs of water for Igo and the surrounding *area*. A 1965 reconnaissance report by the Shasta County Department of Water Resources had concluded that up to 51 connections could be served with piped water from the conduit (SCDWR, 1965). Development of a domestic water system for the Igo area from the conduit would allow increased use of water supplies from the North Fork of Cottonwood Creek in the remainder of the Igo-Ono Community Services District. However, costs of this plan were considered to be too high.

## ALTERNATIVES TO THE PROPOSED PROJECT

The objective of revoking the Certification of Approval is to eliminate the risk to life or property caused by the potential failure of Misselbeck Dam. Several significant environmental effects are associated with the proposed revocation. Alternative actions may be available that would achieve the objective of the project and also reduce or eliminate the significant adverse environmental effects.

Strengthening or rebuilding the present dam to meet acceptable safety requirements, as discussed in the previous section, would eliminate the risk to life or property, as well as all the significant environmental effects of the proposed project.

The no-project alternative would allow the present situation to continue, with attendant risk to life or property from possible dam failure. At least three residences, various outbuildings, and two bridges could be damaged or destroyed by failure of the dam during high storage and streamflow levels. People living in the residences, working or recreating (e.g., hunting, fishing, etc.) on property exposed to the floodflow, or using the bridges could lose their lives. Habitat for fish and wildlife would be significantly degraded by deposit of massive amounts of sediment. This alternative would place *the Igo-Ono Community Services District* in violation of the Water Code. The Division of Safety of Dams of the Department of Water Resources cannot permit this. The Code directs the Department to take such action as necessary to remove danger to life and property.

Misselbeck Dam is currently under the jurisdiction of the Department of Water Resources. Legislative action could exempt the dam from such jurisdiction. Ample justification would be required to persuade the Legislature to allow the continued existence of a threat to life and property. The Legislature could designate the inundation zone as a flood easement and provide for the removal of all structures and compensation for loss of use of property. The two bridges would require reconstruction to avoid damage and possible loss of life should the dam fail. Failure of the dam would still result in significant degradation of habitat for fish and wildlife due to sedimentation and could still result in loss of life to anyone temporarily engaged in activities in the flood easement.

The Department of Water Resources has permitted limited storage practices, upon request by the dam owners since 1966, to allow development of rehabilitation plans and partial water supplies. Water supplies for domestic and some agricultural uses, maintenance of riparian areas along the canal, and fire protection could be maintained *by continuing to allow limited storage.* However, the reservoir might still fill to dangerously high levels during winter storms, since the outlet pipes have insufficient water release capacity. The potential safety hazard from dam failure would still remain, either during uncontrollable winter filling or limited storage during the spring and summer. The Department of Water Resources, therefore, would not be in compliance with provisions of the Water Code, and could not permit this alternative.

## GROWTH-INDUCING IMPACT

Revocation of the Certificate of Approval would not foster economic or population growth in the Igo-Ono area. Economic activity and population could be reduced if remedial actions did not develop sufficient water supplies for the area.

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*Igo-Ono Community Services District*

*Jerry Vossen* — *Chairman*

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Western Shasta Resource Conservation District

Ronald Harber — District Conservationist

# APPENDIX A

# INITIAL STUDY
# ON THE REVOCATION OF THE
# CERTIFICATE OF APPROVAL FOR
# MISSELBECK DAM AND RESERVOIR

January 1988

# APPENDIX A

## INTRODUCTION

Misselbeck Dam has been determined to be in an unsafe condition for storage of water due to several deficiencies. At least a portion of the dam embankment has been determined to be subject to liquefaction at any reservoir storage level under fairly low levels of earthquake shaking. The spillway is hydraulically inadequate, allowing overtopping and erosion of backfill materials at moderate runoff levels. The structural integrity of the spillway is also questionable, as evidenced by continuing deterioration and undermining of a portion of one of the spillway walls. Finally, a potential exists for plugging of the outlet pipes from silt, which has filled the reservoir to a level 10 feet higher than the crown of the intake to the pipes.

The options of adequate investigation to determine the extent of the potential for embankment instability and of remedial work to remove the safety deficiencies have not been addressed by the owner.

The Division of Safety of Dams, Department of Water Resources, is therefore initiating proceedings for the revocation of the Certificate of Approval for Misselbeck Dam and Reservoir, in accordance with Division 3, Part 1, Chapter 7, Article 1.5, of the California Water Code. This action would prohibit storage of water at any level behind Misselbeck Dam. The prohibition of any water storage behind Misselbeck Dam requires either breaching the dam or lowering the spillway elevation so that no storage can occur.

Prohibition of water storage behind Misselbeck Dam may result in the loss of surface water supply used for domestic and agricultural purposes in the service areas encompassing the communities of Igo and Ono, a decrease in ground water quantity and quality in the service areas due to lack of recharge by leakage from the Happy Valley Irrigation Canal, a decrease in plant and animal life dependent upon canal leakage, a decreased fire suppression capability due to reduced water availability to refill fire suppression equipment, and the reduction of potential for catastrophic flood from failure of the dam. Removal of the dam to prohibit storage means that the reservoir would no longer act as a sediment trap for the stream and may also result in decreased protection from flooding following intense rainstorms, and

increased downstream sedimentation and turbidity from erosion of sediments stored behind the dam and from fill materials forming the dam embankments.

## REGULATORY SETTING

Misselbeck Dam and the water conveyance system are owned and operated by the Rainbow Water Company, which acts under a certificate of public convenience and necessity for public utility water service issued by the California Public Utilities Commission. The California Department of Water Resources, Division of Safety of Dams, maintains jurisdiction over enlargement, repair, alteration, removal, maintenance, and operation of the dam and reservoir (California Water Code, Division 3, Part 1, Chapter 4, Article 1). The Department, under authority of the Water Code, Division 3, Part 1, Chapter 7, Article 4, has powers to require the Rainbow Water Company to perform work necessary to disclose information sufficient to enable determination of whether to issue a Certificate of Approval to impound water or to direct work necessary to safeguard life and property. A Certificate of Approval issued by the Department may be revoked or modified to safeguard life and property whenever a dam is determined to be unsafe (Water Code, Division 3, Part 1, Chapter 7, Article 1.5). Chapter 4, Article 5, Part 1 of the Water Code provides legal authority to require whatever action is necessary to prevent storage of water behind Misselbeck Dam.

The Division of Safety of Dams in 1966 prohibited water storage higher than gage height 40 (46 feet below the spillway crest) in Misselbeck Dam. Certificates of Approval issued since 1966 have allowed higher storage from May through August to provide water to customers of the water district while the structural deficiencies of the dam were being evaluated for repair by the owners. Lack of progress in formulating repair plans for the structural deficiencies of Misselbeck Dam has compelled the Department of Water Resources to commence action to prohibit storage of water behind Misselbeck Dam in order to prevent the possibility of catastrophic flooding of downstream areas should the dam fail due to liquefaction during an earthquake or erosion of the dam from the failure of the hydraulically and structurally inadequate spillway.

APPENDIX A

# ENVIRONMENTAL SETTING

## Location

Misselbeck Dam is located in the northeast quarter of Section 31, Township 31 North, Range 7 West, Mount Diablo Base and Meridian. The dam is in Shasta County approximately 16 miles southwest of Redding. The dam impounds water in the North Fork of Cottonwood Creek, which is a tributary to the Sacramento River.

## Ownership

Misselbeck Dam is owned and operated by the Rainbow Water Company. The Rainbow Water Company is a partnership between four parties: Jack and Caroline Schreder, Norm and Andrea Warnke, Peter Fry, and Ralph and Lois Skinner.

## Facilities

The main features of the Rainbow Water Company include Misselbeck Dam, which forms Rainbow Reservoir, Hoover Dam, Hoover Tunnel, and the Happy Valley Irrigation Canal. Misselbeck Dam is a hydraulic fill structure with a length of approximately 1,110 feet and width of 20 feet at the top and approximately 600 feet at the bottom. A survey conducted in 1974 determined the height from toe to crest of Misselbeck Dam to be 96 feet. Elevation at the dam crest is 2,012 feet above sea level. Total freeboard between the dam crest and spillway crest is 14 feet. Original storage capacity was 4,300 acre-feet at the spillway crest and 6,100 acre-feet at the dam crest; siltation to a gage height of 32 feet has reduced storage to an insignificant amount at that level. The unobstructed spillway discharge capacity is 16,000 cubic feet per second (cfs), but is reduced to 9,350 cfs when obstructed with the 4.5-foot bulkhead. Rainbow Reservoir floods an area of about 113 acres and receives water from a 12 square mile drainage.

Controlled releases from Misselbeck Dam are made from two 30 inch diameter steel pipes that are 245 feet long and located in a 12 foot diameter tunnel. The crown of the outlet tunnel is at a gage height of 22 feet. Gate valves are located at both

upstream and downstream ends of the pipes. The pipes empty into the North Fork of Cottonwood Creek, which flows approximately 0.7 mile to Hoover Dam, a 40 foot high concrete arch structure. Hoover Dam is completely filled with sediments, but continues to divert water into Hoover Tunnel, which extends 1.25 miles to Sulphur Creek. Sulphur Creek flows approximately 0.23 mile to Hoover Creek (also called Ducket Creek). Water diversions flow about 0.5 mile in Hoover Creek before joining the 17 mile long Happy Valley Irrigation Canal, which flows to Harbinson Reservoir. Approximately 53 miles of lateral ditches supply water from the main canal to customers. The water supply is augmented by natural flows in Moon, Dobey (Doby), Byron (Rector), and Eagle Creeks.

**History**

The water system was originally established about 1870 by the Dry Creek Tunnel and Fluming Company to provide water for mining operations. Waters diverted from area creeks were transported via ditch and flume to the Happy Valley area. The water system and water rights were acquired by the Happy Valley Land and Water Company in 1907 and by the Happy Valley Irrigation District in 1917. Misselbeck Dam and Hoover Dam and diversion tunnel were completed in 1920. The irrigation district became bankrupt and was dissolved in 1925, whereupon the Happy Valley Water Company was organized to continue operation of the water system. The Happy Valley Water Company changed ownership in 1965 and was sold again in 1967, becoming the Trisdale Water Company. The water company was sold to the present owners in 1984 and became known as the Rainbow Water Company.

**Water Rights**

Rainbow Water Company possesses pre-1914 appropriative water rights originally adjudicated to the Happy Valley Irrigation District in a 1920 decree and statutory appropriative water rights under permit 533 (Application 784, License 2461), issued in 1942 by the State Water Commission (now the State Water Resources Control Board). The 1920 decree allows the water company to divert from the natural flow of the North Fork of Cottonwood Creek a continuous flow of 16 cfs during the

irrigation season (March 15 to November 1), subject to reduction during periods of shortage according to the allotment ratios of other users. The decree also entitles the water company to the natural flow in Hoover (Ducket), Dobey (Doby), Byron (Rector), Hulen (Huling), and Eagle Creeks.

Appropriative water rights under permit 533 authorize storage of 4,800 acre-feet per year in Misselbeck Reservoir for domestic and irrigation uses on about 18,110 acres of land. These water rights may have been modified by partial forfeiture as a result of reduction in use since the permit was issued and reservations made upon sale of the Happy Valley Water Company to the Trisdale Water Company. Partial forfeiture of some appropriative water rights may have occurred because siltation has severely reduced the storage capacity of Misselbeck Reservoir and water has not been stored to the remaining capacity for a period of several years. The law of appropriation maintains that a water right is held only so long as the actual use is exercised, thus water rights to the unused portion of the allowed 4,800 acre-feet of storage may no longer exist. Also, the 1967 sale of the Happy Valley Water Company reserved to that company the right, option, and privilege of diverting in perpetuity up to 100 inches of the first flow of the waters of the North Fork of Cottonwood Creek measured under a 6-inch pressure (equaling 2.5 cfs) at a point above Hoover Dam and 20 percent of the water up to 200 inches (5 cfs) at the Dry Creek outlet during the irrigation season. The reservation for 100 inches has been transferred to Rainbow Lake Properties. The 200-inch reservation may no longer be valid because of lack of use by the Happy Valley Water Company.

**Service Area**

Water is provided to two divisions by storage behind Misselbeck Dam. Division 1 encompasses lands between Hoover (Ducket) Creek and Eagle Creek, with the community of Ono the main population center. Division 2 encompasses lands between Eagle Creek and Harbinson Reservoir, which has the community of Igo as the main population center. Prior to completion in 1967 of the Clear Creek South Unit of the Central Valley Project, water was also provided to 5,000 acres in the Olinda area, which was the Division 3 service area. The communities of Igo and Ono formed the Igo-Ono Community Services District in 1964, comprising about

8,500 acres, of which about 2,900 acres are irrigable for pasture and fruit production.

Water is delivered to customers of the Rainbow Water Company through turnouts from the Happy Valley Irrigation Canal. Between 42 and 48 customers are served directly from the canal, while 16 customers are served from one head delivered to Ono and 6 customers are served from one head delivered to Igo. During the 6 years beginning in 1982 and ending in 1987, an average of 550 acre-feet of water was delivered to customers of the water company in the Igo-Ono Community Services District. The maximum water delivered for these years was 600 acre-feet in 1984, while the minimum delivery was 500 acre-feet in 1983. Restrictions on storage levels behind Misselbeck Dam and leakage from the irrigation canal severely limit the amount of water available to the service area. More water would be used if available in the service area, as well as in adjacent areas not presently served by the water company.

The economy of the area is based almost exclusively on agriculture, with some contribution from quarrying of native stone and sale of timber for firewood. Mining, which was once an important part of the economy, has all but disappeared.

Irrigated acreage in the area varies from between 200 to 1,000 acres, depending on the annual availability of water. In recent years, about 500 acres have been irrigated with water from the reservoir. Most of the irrigated acreage is devoted to pasture grasses for livestock grazing, with some fruit crop production. Much of the arable land is not irrigated, even when sufficient water had been available in the past, because the cost of water delivered from Misselbeck Dam is too high.

The communities of Igo and Ono are the population and business centers for the surrounding farm areas comprising the Igo-Ono Community Services District. The population in the district is about 400 people and has grown little in the past 20 years, due to the limited water supplies.

Fire protection to the area is provided by the California Department of Forestry, with stations located in Ogo, approximately 8.5 miles southwest of Ono, and Redding. Ability to control wildfires in the Igo-Ono Community Services District is enhanced

by the availability of water for refilling fire suppression tanker trucks from the irrigation canal or various small storage impoundments fed by the canal.

### Hydrology

The drainage basin for Misselbeck Dam encompasses approximately 12 square miles, ranging in elevation from 2,012 feet at the dam crest to 5,955 feet in the upper watershed. Rainfall varies from 40 to 50 inches per year at the lower elevations to 50 to 70 inches per year in the higher reaches. Snowfall ranges from about 9 inches at lower elevations to 25 inches at higher elevations. From 75 to 90 percent of the annual precipitation occurs from November 1 to April 30.

The North Fork of Cottonwood Creek originates in the upper drainage basin of Misselbeck Dam. The average annual runoff at Misselbeck Dam from the watershed is estimated at 20,000 acre-feet. Siltation limits maximum storage at the spillway crest of the dam to about 3,600 acre-feet. Excess runoff from the watershed is joined by flows in Moon Creek approximately 0.25 mile below Misselbeck Dam. Several other tributaries, including Hoover (Ducket), Dobey (Doby), Byron (Rector), Eagle, and Hulen (Huling) Creeks, join the North Fork of Cottonwood Creek before merging with the Middle Fork of Cottonwood Creek to form the main stem. Cottonwood Creek then flows to the Sacramento River.

### Ground Water

The Redding Basin is a ground-water-yielding area bounded on the north by the Klamath Mountains, on the east by the foothills of the Cascade Range, on the west by the foothills of the Klamath Mountains and Northern Coast Range, and on the south by the Red Bluff arch. Water-bearing sedimentary deposits in the ground water basin are underlain by either nonwater-bearing or saltwater-bearing deposits of Cretaceous Age, which are at or near the surface on the western edge of the basin. The ground water basin is roughly bounded on the western edge by Gas Point Road and Clear Creek Road to the north.

The land area encompassed by the Igo-Ono Community Services District,

encompassing the western edge but mostly lying to the west of the Redding Basin, is underlain near or at the surface by Cretaceous Age rock. The formation is generally nonwater-bearing or saltwater-bearing, though limited quantities of fresh water may be found in fractures. Leakage from the Happy Valley Irrigation Canal infiltrates the fracture system and may recharge wells located along fractures.

**Geology**

Misselbeck Dam is within the Klamath Mountains Geomorphic Province. This province covers an elongate, north-trending area in northwestern California and southwestern Oregon. It includes the eastern portions of Del Norte and Humboldt Counties, the western portions of Shasta and Siskiyou Counties, and the northern portion of Trinity County. It can be divided into four belts: the Western Jurassic belt, the Western Paleozoic and Triassic belt, the Central Metamorphic belt, and the Eastern Klamath belt. Misselbeck Dam is in the Eastern Klamath belt.

Misselbeck Dam is underlain by the Shasta Bally Batholith, which was intruded near the eastern boundary of the Central Metamorphic belt. The Shasta Bally Batholith, the largest pluton in the Eastern Klamath belt, is a deep-seat intrusive mass of rock which has been exposed by erosion and probably is much larger at depth. The batholith was probably intruded in the Late Jurassic and has been age-dated at 134 million years.

The Shasta Bally Batholith is light-colored quartz diorite and granodiorite. It is deeply weathered to decomposed. The decomposed rock is equivalent to a sandy silt, according to the Unified Soil Classification System.

The diorite forming the foundation for the dam and spillway is moderately coarse grained and relatively free from joints and dikes. Surface material (overburden) is a weathered, loose, granular, coarse sand which gradually becomes rock at a depth of about 10 feet.

The overburden was reported to have been removed from the core area on the abutments and in the channel. A core trench was apparently excavated in this area

to a depth of about 10 feet. The overburden apparently was not removed beneath the shell or fill material. The conclusion is that the cutoff is effective.

The entire spillway cut is in diorite. It was apparently excavated by sluicing out the decomposed or weathered diorite down to resistant rock. There has been considerable erosion of the diorite in the lower spillway from past overflows, thereby raising concerns for the safety of the dam should the entire spillway erode. Problems with erosion of the spillway will be minimized or halted by hard, resistant rock lying beneath the upper portion of the spillway.

**Seismicity**

Knowledge of the seismicity of the Misselbeck Dam area is constantly growing. This is reflected by the progression to higher bedrock acceleration values with time. The early investigators considered the site seismically quiet. Since then, knowledge of the tectonics of the west coast has grown, causing re-evaluation of original estimates of seismicity.

There are three major fault zones which are capable of producing the maximum credible earthquake (MCE), which will produce the peak bedrock accelerations (PBA) at Misselbeck Dam. The three major fault zones are: Gorda Plate Subduction Zone, Mendocino Fracture Zone, and the Eaton Roughs-Lake Mountain Fault Zone. The MCE is the maximum earthquake that appears capable of occurring under the presently known tectonic framework. The PBA is the movement of the rock or foundation that can be expected during an MCE.

The Gorda Plate Subduction Zone is the boundary between the North American Continent and the Gorda Plate (Pacific Ocean crust). The Gorda Plate is being driven beneath the North American Continent and thus causing earthquakes. This zone is 53 km beneath the dam, and a 0.2 g PBA can be expected from an assumed MCE of 7.0

The Mendocino Fracture Zone is a major fault normal to the California Coast just south of Eureka. This fault is 90 km from the dam, and a 0.11 g PBA can be expected

from an assumed MCE of 7.5.

The Eaton Roughs-Lake Mountain Fault Zone is subparallel to the coastline just east of Eureka. This fault is 90 km from the dam, and a 0.12 g PBA can be expected from an assumed MCE of 7.5.

Additionally, the U. S. Army Corps of Engineers determined the design earthquake for their Cottonwood Creek Project would be a 5.5 magnitude event 5 to 10 km below the site. This would result in a PBA of 0.14 g.

The engineering firm of $CH_2M$ Hill evaluated the liquefaction potential of the embankment with the above PBAs at the location of the single exploratory drill hole. It was determined that the central portion of the embankment is susceptible to liquefaction at these acceleration levels. The Division of Safety of Dams concurs with $CH_2M$ Hill's conclusions.

*Wildlife*

Overstory vegetation in the reservoir drainage basin is dominated by ponderosa pine (Pinus ponderosa) occurring in open stands with a few scattered sugar pines (Pinus lambertiana) and black oaks (Quercus kelloggii). Manzanitas form the dominant understory on drier exposures, with both white-leaf manzanita (Arctostaphylos viscida) and green-leaf manzanita (Arctostaphylos patula) present. Deerbrush (Ceanothus integerrimus), Lemmon ceanothus (Ceanothus lemmonii), and California coffeeberry (Rhamnus californica) are common on less exposed sites. A few scattered willows (Salix sp.) are located within the drawdown zone of the reservoir near the inlet of the North Fork of Cottonwood Creek. Numerous grass and forb species are also present along the banks in the drawdown zone.

The upper portion of the Happy Valley Irrigation Canal traverses a vegetative community dominated by ponderosa pine, digger pine (Pinus sabiniana), and black oak, with a moderate to dense brush understory. Riparian tree species maintained by leakage from the irrigation canal in this reach include big-leaf maple (Acer macrophylum), white alder (Alnus rhombifolia), and willow, with a relatively

dense understory of blackberry (Rubus sp.) and wild grapes (Vitis californica). The lower reaches of the irrigation canal traverse a blue oak (Quercus douglasi) and digger pine community with scattered mature valley oaks (Quercus lobata) on the deeper soils. Riparian species are dominated by willows with an understory of blackberry and scattered clumps of cattail (Typha sp.). The numerous seeps along the irrigation canal are marked by succulent grass and forb cover in contrast to the much drier surrounding vegetation.

Rainbow trout (Salmo gairdneri) were stocked in the reservoir formed by Misselbeck Dam from 1942 to 1953. A large (7.5 pound) German brown trout (Salmo trutta) was caught in the reservoir in 1955. Fishermen had also reported the presence of sunfish and catfish in the reservoir. No surveys of fish populations in the reservoir have been conducted, but prickly sculpin (Cottus asper), smallmouth bass (Micropterus dolomieui), bluegill (Lepomis macrochirus), green sunfish (Lepomis cyanellus), mosquito fish (Gambusia affinis), brown bullhead (Ictalurus nebulosus), Sacramento sucker (Catostomus occidentalis), Sacramento squawfish (Ptychocheilus grandis), hardhead (Mylopharoden conocephalus), California roach (Hesperoleucus symmetricus), carp (Cyprinus carpio), brown trout, and rainbow trout are reported to be common to abundant in the lower reaches of the North Fork of Cottonwood Creek. The reservoir is not currently open to public fishing.

Numerous game species occur in the reservoir area, including black-tailed deer (Odocoileus hemionus columbianus), black bear (Euarctos americanus), western gray squirrel (Sciurus griseus), black-tailed jackrabbit (Lepus californicus), California quail (Lophortyx californica), mountain quail (Oreortyx pictus), mourning dove (Zenaida macroura), band-tailed pigeon (Columba fasciata), and wild turkey (Meleagris gallopavo). Lack of emergent vegetation in the reservoir limits waterfowl use to very low levels. No endangered, threatened, or rare species are known to occur within the reservoir area. Riparian habitat created by leakage from the irrigation canal is seasonally important to many game and nongame species. Reduction in quantity or quality of riparian habitat along the canal would adversely affect many species.

## ENVIRONMENTAL IMPACTS

### Water Supply

The Rainbow Water Company presently delivers about 600 acre-feet of water stored behind Misselbeck Dam each year to customers in the Igo-Ono Community Services District. Water is delivered directly from the Happy Valley Irrigation Canal to between 42 and 48 customers and the towns of Igo and Ogo, which deliver water to 16 and 6 customers, respectively. Leakage from the Happy Valley Irrigation Canal may maintain water levels in wells used for water supply by other residents in the district.

Water delivered from storage behind Misselbeck Dam, either directly from the Happy Valley Irrigation Canal or indirectly through ground water recharge, is used for domestic supplies and irrigation of pasture and fruit crops.

Prohibition of water storage behind Misselbeck Dam would preclude domestic use and irrigation of approximately 500 acres of pasture and fruit crops. Natural flows in the North Fork of Cottonwood Creek at Misselbeck Dam, Hoover (Ducket) Creek, Dobey (Doby) Creek, Byron (Rector) Creek, Hulen (Huling) Creek, and Eagle Creek, for which Rainbow Water Company has adjudicated and statutory appropriative water rights, may not be sufficient to supply the needs of water users presently dependent upon storage behind Misselbeck Dam. As many as 70 customers would be directly affected and an unknown number of residents would be indirectly affected by lack of water from the reservoir.

Natural ground water supplies are either insufficient or of poor quality to supplement natural surface flows. Other water supply sources are presently undeveloped, but may be developed as alternative water supplies. The North Fork of Cottonwood Creek may be able to provide water to the Ono area. A turnout on the Muletown Conduit of the Clear Creek South Unit, capable of supplying 0.5 cfs, could be developed to provide domestic water to the Igo area. Construction of new reservoirs, such as Shoemaker Reservoir on the North Fork of Cottonwood Creek, Petty Butte Reservoir on the South Fork of Clear Creek, or a Moon Fork Diversion

to Hoover Dam, could provide both domestic and irrigation supplies. The present system could also be retained, but would require extensive rehabilitation. Prior water rights for alternative supplies would need to be evaluated and funding acquired to construct alternative supplies.

**Fire Protection**

The Happy Valley Irrigation Canal and various small storage impoundments fed by the canal provide a source of water for refilling fire suppression tanker trucks.

Prohibition of water storage behind Misselbeck Dam may preclude the availability of water from the irrigation canal for use in fire suppression. Sufficient sources of water for fire suppression needs may still be available, however, from the many creeks that flow through the area.

**Flooding**

Misselbeck Dam regulates surges in winter runoff, reducing peak floodflows. Runoff from the drainage basin upstream from the dam in excess of the capacity of the outlet pipes is contained in reservoir storage up to the elevation of the spillway. Maximum discharge through the two outlet pipes has been calculated to be about 260 cfs. However, the limited storage capacity of the reservoir (about 3,600 acre-feet) greatly reduces the ability to regulate severe floods that could produce flows up to 1,770 cfs (3,500 acre-feet in 24 hours), expected to occur about once every hundred years, and 3,150 cfs (6,240 acre-feet in 24 hours), expected to occur about once every thousand years.

**Wildlife**

The reservoir formed behind Misselbeck Dam creates aquatic habitat for a variety of cold and warmwater fish species. Numerous game species also occur in the reservoir area. Leakage from the Happy Valley Irrigation Canal provides water and maintains riparian habitat, providing food and cover to a variety of both game and nongame species.

Prohibition of water storage behind Misselbeck Dam would eliminate the reservoir habitat used by fish and wildlife. However, losses of fish and wildlife dependent on the reservoir would probably be insignificant. Coldwater species of fish have not been stocked in the reservoir for 35 years. Low reservoir storage levels during late summer and subsequent warm water temperatures have probably eliminated carryover capacity in the reservoir for coldwater species. The natural flow of the North Fork of Cottonwood Creek above the reservoir formed by Misselbeck Dam would be unaffected by prohibition of storage behind the dam and would continue to provide coldwater fisheries habitat, as presently occurs when conditions in the reservoir are unsuitable for coldwater species. Habitat for warmwater fish species may be reduced in the absence of the reservoir. The types of warmwater fishes occurring in the reservoir have not been determined, but are likely those same species present in abundant quantities in the lower reaches of the North Fork of Cottonwood Creek. No impacts to the populations of these species would occur due to the elimination of the reservoir habitat. Sport-fishing opportunities would not be affected, since no public fishing is currently allowed at the reservoir.

Wildlife would no longer have the reservoir available as a water source, but would continue to have water available in the stream channel of the North Fork of Cottonwood Creek.

Loss of water transported in the Happy Valley Irrigation Canal would eliminate many seeps and riparian areas critical for maintaining wildlife populations in the area. The loss of habitat from lack of water would displace dependent wildlife species to other areas where suitable habitat occurs. However, some losses would occur as displaced individuals compete for resources with those individuals currently inhabiting the other areas.

**Sedimentation**

Misselbeck Dam has functioned as a sediment retention trap for over 60 years. Sediments are currently about 30 feet deep near the dam. Removal of the dam to preclude the storage of water would allow erosion of the sediment deposits with subsequent adverse impacts to downstream aquatic life through siltation. Partial

removal of the dam to the elevation of the sediments would reduce erosion, though suspended sediments carried by the North Fork of Cottonwood Creek near Misselbeck Dam would increase because the opportunity for settling would be eliminated. The potential would still exist for failure through liquefaction of the remaining portion of the dam, whereupon erosion of deposited sediments would occur with subsequent downstream siltation. Mass movement of the deposited sediments following failure of the remaining dam is not expected.

## DETERMINATION

Revocation of the Certificate of Approval to store water behind Misselbeck Dam may have significant effects on the environment, and an Environmental Impact Report is required.

The following impacts identified in the discussion of environmental impacts are significant: (1) loss of domestic and agricultural water supply to some residents in the Igo-Ono Community Services District; (2) decrease in plant and animal life dependent upon leakage from the Happy Valley Irrigation Canal; and (3) potential siltation in the North Fork of Cottonwood Creek, Cottonwood Creek, and the Sacramento River.

Prepared by:

Gerald Boles
Environmental Specialist IV
Northern District

Date: January 21, 1988

# APPENDIX B

## PROCEEDINGS OF THE PUBLIC HEARING
## AT THE
## ONO GRANGE HALL

NOVEMBER 2, 1989

Introduction by Jerry Vossen (Chairman of the Igo-Ono Community Services District): We have Gil Spencer (Vice Chairman), George Lutz, Ken Comely (Secretary), and, unfortunately, our fifth member, John Moore, just got released from the hospital from open-heart surgery today, so he is not available. I'd also like to introduce Larry Preston from Shasta County Special Districts and Cheri Beck from Jim Nielsen's office.

We have with us tonight Jerry Boles from the Department of Water Resources, Don Babbitt and Bill Bennett from the Division of Safety of Dams. These gentlemen are here for your public comments as we explained prior. This is not a result of the earthquake in San Francisco. This did not just happen. So, we have an opportunity as a community to speak up and protect and control our own destiny. We had a very productive meeting up at the dam today. We, the board of directors, met with these gentlemen. We feel there is tremendous room for progress, but we have to, as a community, hand together. These people are looking for some affirmative action. This thing has been a problem for four decades and they're tired of promises. We need to show progress and with that, I'll turn it over to Jerry Boles.

Introduction by Gerald Boles (Department of Water Resources): First, I would like to briefly review the role of the Division of Safety of Dams, then the California Environmental Quality Act, the safety concerns that the Division of Safety of Dams has about Misselbeck Dam, the environmental effects that may occur if the Certificate of Approval to store water is revoked, and the alternatives. We will then open the meeting to public comments. I did bring copies of the Draft Environmental Impact Report (EIR) for anybody who wants a copy but has not received one. Much of this I will just read from the draft EIR. It will be faster and clearer, too.

The Division of Safety of Dams has jurisdiction over the construction, enlargement, alteration, repair, maintenance, operation, and removal of dams and reservoirs for the protection of life and property (Division 3 of the California Water Code). A dam is defined as any artificial barrier which does or may impound or divert water and which is 25 feet or more in height from the downstream toe of the barrier to the

maximum possible water storage elevation or impounds 50 acre-feet or more of water. In determining whether a dam or reservoir constitutes a danger to life or property, the Water Code states that the Department "shall take into consideration the possibility that the dam or reservoir might be endangered by seepage, earth movement, or other conditions which exist or which might occur in any area in the vicinity of the dam or reservoir. Whenever the Department deems that any such condition endangers a dam or reservoir, it shall order the owner to take such action as the Department determines to be necessary to remove the resultant danger to life and property." That is all a direct quote out of the Water Code. The Water Code further gives the Department authority to require owners of dams to perform engineering, geologic, and other work, as necessary, to disclose information sufficient to enable the Department to determine the structural integrity of dams and to perform other work necessary to safeguard life and property. The owner of a dam has the option of complying with Department orders, removing the dam from service so that it no longer will impound water, or reducing the size of the dam and reservoir to less than the size of a jurisdictional dam.

The Department issues a Certificate of Approval that prescribes limitations for the safe impoundment of water. Whenever a dam or reservoir has been determined to endanger life and property, the Department may either amend the terms and conditions of an existing Certificate (which may include requiring an owner to lower the water level or empty the reservoir) by issuing a revised Certificate or revoke the Certificate of Approval to impound water. After a certificate has been revoked, the owner of a dam is prohibited from taking actions or inactions that cause the dam to impound water. That is basically the role of the Division of Safety of Dams and their authority as specified by the Water Code.

The California Environmental Quality Act requires the Department to consider the environmental effects of an amendment or revocation before taking action to alter a Certificate of Approval. An initial study was completed on January 21, 1988 which determined that significant environmental impacts would result from revocation of the Certificate of Approval to impound water behind Misselbeck Dam. The Department, as the lead agency, prepared and distributed to responsible agencies on

January 22, 1988 a Notice of Preparation that stated the Department's intention to proceed with an EIR, in accordance with CEQA guidelines. A scoping session was held here (Ono Grange Hall) on March 17, 1988.

The Draft EIR was completed and available for review on October 1 of this year (1989). CEQA requires a 45 day review period. All comments, therefore, must be submitted to the Department by November 15, 1989. Though not required by CEQA, we are holding this meeting to be sure everyone has an opportunity to comment on the Draft EIR. After the comment period closes on November 15, we will incorporate the Draft EIR, all comments we received, and responses to comments into a final EIR. We expect to complete the Final EIR by December 15.

The EIR is an informational document. It will be used to inform the Division of Safety of Dams of the importance of Misselbeck Dam to this area and the environmental effects that would occur if the dam were removed from service. We want to be sure that the EIR includes any concerns that you may have. After the EIR has been completed, the Water Code then allows the Department to modify the Certificate of Approval or conduct a hearing to consider revocation of the Certificate of Approval. Revocation would require that you undertake measures to insure that no water is impounded through action or inaction behind the dam. Any modifications to the dam to preclude the impounding of water requires approval and inspection by the Department.

As far as safety concerns, this document (Draft EIR) points out that Misselbeck Dam has several deficiencies that make impoundment of water unsafe. At least a portion of the dam embankment has been determined to be subject to what is termed liquefaction at any reservoir storage level under fairly low levels of earthquake shaking. Liquefaction basically means that during shaking caused by an earthquake, the fill material of the dam under saturated conditions would essentially turn to mush. Pressure of the water behind the dam may then force the whole structure downstream. The spillway is hydraulically inadequate, allowing overtopping and erosion of backfill materials by moderate surface runoff. The structural integrity of the spillway is also questionable, as evidenced by continuing deterioration and

undermining of a portion of one of the spillway walls and spalling of the spillway floor, which has exposed badly corroding steel reinforcing bars. The outlet pipes could be plugged by sediment that has filled the reservoir to a level ten feet higher than the crown of the intake to the pipes.

Failure of the dam would result in discharge of nearly 2 million cubic yards, or about 1,150 acre-feet, of water and sediment to the North Fork of Cottonwood Creek. This discharge would affect several residences and ranches in the downstream areas, a couple of bridges, anadromous fish spawning habitat, and anybody working or recreating in the flood plain at the time that failure may occur.

The previous owners of the dam have failed to comply with orders from the Division of Safety of Dams directing correctional work. The Department, therefore, is initiating proceedings to revoke the Certificate of Approval that was issued April 29, 1981 for Misselbeck Dam and Reservoir.

Prohibiting water storage behind Misselbeck Dam would lead to several significant effects. Water storage would be lost by the Rainbow Water Company, which was the title of the company when we started these proceedings. It services about 70 customers in the Igo-Ono Community Services District. Some revenue to the water company would be lost. Though sufficient water may be available through natural stream flow in normal run-off years to meet current requirements, the water company may not be able to meet demands during dry years. Natural annual fluctuations in runoff may produce an undependable water supply. Sufficient water may not be available to maintain flow through the entire distribution canal, which would result in loss of recharge to some wells and loss of some riparian habitat maintained by canal leakage. Some wildlife associated with the riparian habitat would also be lost. Future growth and agricultural development would be limited. Fire suppression capabilities would be reduced. However, catastrophic failure of the dam embankment and subsequent downstream mass movement of fill material, water, and sediment would be eliminated.

There are several alternatives available for maintaining a water supply.

Engineering evaluation and remedial action to rehabilitate Misselbeck Dam would allow continued water storage, either at full capacity or some reduced level. Specific remedial actions currently deemed necessary include a complete seismic evaluation of embankment stability followed by any necessary rehabilitation, spillway realignment and rehabilitation, and outlet pipe modification. If the present dam can not be rehabilitated, a new dam could be constructed at the existing dam site or several other possible sites including near Hoover Dam and upstream of the existing dam on the North Fork of Cottonwood Creek, the South Fork of Clear Creek, and Doby Creek. The distribution system efficiency could be improved through regular maintenance, elimination of unauthorized diversions, and the repair of badly leaking areas. The entire distribution system could also be plumbed. These improvements would increase the available supply from the natural flows of the North Fork of Cottonwood Creek.

The Department recognizes that corrective actions to Misselbeck Dam will be costly and we have been exploring various financing options that may be available to this area for either rehabilitating Misselbeck Dam or finding alternative sources of water. These options could include both low interest loans and grants. We hope to be able to provide this information to the Igo-Ono Community Services District as well as Larry Preston of Shasta County sometime next week.

At this point, I would like to open the meeting to any comments that anybody would like to make on that Draft EIR.

Comment: After your comments regarding the draft report, and what I've read in the paper and heard in the news about this situation, I've realized that there is some threat to human life. Two... three... four... five people, and their safety is very important. We're talking about a couple of bridges; we're talking about spawning habitat. The flood plain is down below us, but what you're talking about by revoking this permit, by dismantling the dam, you're wiping out two entire communities. Not just the livelihood that some people might get off the land by raising cattle or hogs or whatever, but the equities that they've built up in these properties either through inheritance from their parents or grandparents, or

purchased. You're wiping out their lives, their livelihoods. Where do they go from here? Are they going to be able to start a new life? And I don't think the engineers can respect this. They deal with calculators, with seismology reports. They don't deal with humanity. I think that we have to address this.

Response: Yes, I agree. They are very real concerns. The Division of Safety of Dams, however, does not have any options available to it. The Water Code, which was developed through the legislative process, specifically requires action be taken - actions to prohibit unsafe dams from impounding water. We will be responding in the EIR to all comments we receive. We fully recognize the importance of the dam and the water supply to this area. The purpose of the EIR is to make sure that this information is available to the Division of Safety of Dams before they hold the hearing to consider the revocation of the Certificate.

Comment: Which is more feasible, to spend $10 million to demolish the dam or grant us $1 million to repair it?

Response: To my knowledge, there have been no cost estimates developed for repairing the dam or for developing alternate water supplies. Obviously, if what you say is true, 10 to 1 comparison, it would be much more worthwhile to spend $1 million to repair the dam, but, in any case, it does need to be repaired before it could be allowed to be fully usable.

Comment: I understand you're researching funding possibilities for us. Is there going to be funding available for the engineering, the seismology tests?

Response: Hopefully, the low interest loans or grants that may be available would also cover those types of activities.

Comment: So we couldn't tell you whether or not we could afford to do the tests until you tell us whether or not you can find the money for us?

Response: It's not the Department's responsibility, according to the Water Code, to

develop the funding. However, we are doing this because we are concerned that the area maintain a water supply. We are trying to assist representatives of the Igo-Ono Community Services District and Shasta County in applying for funds to try to solve this problem.

Comment: Did we hire our engineer? Do you know?

Response: Yes. The District has hired Kurt France to assist.

Comment: First of all, I want to thank the Igo-Ono Community Services District for their efforts to work with the community to save this situation. I think they've done very good, very great work. Lots of us work over there, we get our supplies over there, etc. If we didn't have the water, we wouldn't be here. Also we have to consider that this is a very nice area to raise our children away from crime and drugs, and there are a lot of people that do move up here from San Francisco and even from Los Angeles and this is a very serious thing. This area should be here.

Response: Thank you. I agree this is a very nice area.

Comment: Hi, I'm from the Gas Point area. Many people are concerned about our wells. And I'm talking to the majority of people out there and we have looked to this water source as our future. We have and we are concerned about the contamination of our wells. So I want you to include that area too as a future water source. Just because we know leaching gets into wells and it's a new dump. We know that. If it takes us years from testing our water and if they return a mandate, there will be litigation.

Response: Thank you.

Comment: In page 71 of the EIR, it says other methods of possible rehabilitation of the dam may exist. All alternatives require an engineering analysis to be designed. I realize from the question you're saying the planning, the grant writing, whatever, would be the responsibility of our board. Should those plans be secured? Can your

agency assist in an engineering drawing or would that be up to us or to our board to secure a private engineering firm? Can we count on the State?

Response: That is something that we did discuss this afternoon. What came out at that discussion was that the Department could not take an active role in design engineering or evaluation of the dam, in the testing itself. But the engineers from the Division of Safety of Dams would do whatever is necessary to work with the engineer that the District hired to make sure that work done is pertinent to getting the problems resolved.

Comment: On page 76, the comment is that revoking the Certificate of Approval would not foster economic growth or population growth, of which I am sure you are in agreement with. Economic activity and population could be reduced if remedial actions did not develop sufficient water supplies. I'm just curious to your word "remedial".

Response: We mean repairing the dam or finding an alternative source of water.

Comment: In terms of the degree of what's going to have to be done to bring the dam up to safety, to your standards, such that the permit could remain, would that be something that would be pretty clear to us when the final EIR is complete?

Response: No. Again, the EIR will just be covering the environmental effects if the dam were removed. The engineering evaluation that would be provided to the Department for review is separate from the EIR.

Comment: And my last comment is on the last page where you list three environmental impacts: the loss of water, the decrease in plant and animal life, and potential siltation for the Cottonwood Creek. I would think that one more comment on there could be the loss of wildlife habitat due to wildfire, and it was mentioned on page 54 of the report that CDF does depend on the ponds fed by the ditch, as stated in there, and after talking to everyone who's been in this area that that's a crucial part and that seems to not be dealt with as heavily as other life.

Thanks for your time.

Response: Thank you. We will look into that.

Comment: On the subject of fires, have you been to see our local CDF department, and if so what contact person? Are you aware of the fire classifications of the area that exist, primarily high and extreme? Are you ready for the fires, and are you aware that at least one case of which I am aware, that we have a dead end road in which we have limited entrance and exit, so in other words, if we have a wildfire, there are people that may be potentially trapped? So are you aware of the fact or have you received information on what is to be done?

Response: When we prepared the Initial Study, we sent a copy to the local California Department of Forestry station for their comments. They did relay the importance of ponds and waterways that are maintained from Misselbeck Dam. That's the extent of the comments that they provided. Hopefully, they will provide more comments to us on the Draft EIR.

Comment: At what point, or will you, figure to name your funding cap on the dam as far as funding and costs are concerned? Will you do that in your next report or will you not address it at all? And the costs of whoever happens to evaluate the renewal of the dam.

Response: No, because that requires an engineering evaluation to determine exactly what is needed at the dam, which could vary. There is no way that we can determine that until such an evaluation has been made, and that is, again, beyond the scope of the EIR.

Comment: But that will be addressed in the next report or someplace down the road before the hearing?

Response: It will not be addressed in the Final EIR. That will have to be addressed by the consultant that the District may hire to evaluate what is needed to rehabilitate

the dam.

Comment: So in other words, you guys are not going to address the subject of costs at all?

Response: That's correct .

Comment from Jerry Vossen: I would like it stated for the record, being Chairman for the Community Services District and acting on the mandate of the people here, through the negotiations and becoming the owner of Misselbeck Dam and it's liabilities, I would like you to see, and be noted, that the encouragement as well as the verbal assertion, that we were lead to believe that we would have sufficient time as long as we were showing progress. I think we, as a District or community, have shown significant progress, more so in the last 18 months than any other time in the last 20 years, on the dam or distribution system. I would think that the revocation of the permit to store water at this time ... we are a community services district and oppose Proposition 13. Our only source of revenue is water savings. If you revoke that permit, we cannot hire, consult with anybody. We need revenue from the water savings, and we have every intention as a board in representing these people to fulfill and follow through on our word and our commitment, and we have every intention of bringing this dam up to standards.

Comment: Have they considered the fact the financial difficulty that this is going to put this whole community in out here if they eliminate the dam? Not to mention the interest rate of the loan and everything else. A lot of people can't get by on what they got right now, let alone pay on the loan whether it be low interest or not. They can't pay on something that they don't have the money to pay now.

Response: Yes, we recognize that, and again, the Water Code doesn't allow the Division of Safety of Dams to take that into consideration when they're determining whether a dam is safe or not, and allow it to store water. However, we do recognize that funding mitigation measures to ensure the safety of the present dam or develop new water supplies systems will be a financial impact on this District. In addition to

low interest rate loans, there are also grant programs that are available. Some are specifically directed to rural areas that are low to moderate income. We have some of these types of programs to assist in retaining a water supply.

Comment: Wouldn't it be cheaper to just fix the dam than to try to apply for all these grants and everything?

Response: No, it's going to be much more expensive to repair the dam than to invest in applying for grants.

Comment: Are these grants and loans federal or State?

Response: They're both State and federal loans and grants.

Comment: What's the purpose of an EIR report?

Response: It's an informational document that's required by the California Environmental Quality Act. It's purpose is to be sure that all the environmental effects are considered for any project. In this case the project is defined as the revocation of approval to store water. It's purpose is to provide the Division of Safety of Dams with information on the importance of the water supply and the effects that would occur if the Certificate were revoked.

Comment: Who made the decision that the dam is supposedly unsafe, whatever that means?

Response: In 1971, an earthquake in Southern California caused a partial failure of a dam in the San Fernando Valley. It was the same type of structure as this. At that time, the Department ordered owners of all such dams to perform engineering and seismic evaluations to determine the structural soundness. The previous owner contracted with a local Redding consulting firm to do a partial structural analysis of this dam. That consultant's conclusion was that the dam is indeed subject to liquefaction at least in that portion of the dam that was studied.

Comment: I understand that it said that it could fail and liquefy at 0.7 PBA. Ok, and somebody in this EIR, I assume you, said that Stony Creek is capable of 0.9 PBA?

Response: I could look in here to find the figures. Do you know what page it's on? Ok, I have the figures.

Comment: I got a couple questions about that. Is that major impact earthquake or are there assumptions that's based on? And the other question is what's the effect of Stony Creek, being 30 miles away, on PBA? And also I want to point out that the Eureka fault has a capability of 7.5, and we had a 7.05 in the last 20 years to no effect. What's the effect of the distance on Stony Creek Fault on the PBA and Misselbeck Dam?

Response: Each bedrock acceleration you see in that column is based on the distance from that fault. So if an earthquake were to happen on that fault of that magnitude, based on other earthquakes in California and around the world, we could expect the acceleration that you see in that column that's based on distance.

Comment: Where is that figure? Where was that obtained? Who came up with 0.9?

Response: That's based on research papers, mostly out of Berkeley, but there's a large number of correlation curves...earthquakes, distance, magnitude...to develop this. For reference you could see Seed-Idriss' 1981 curve developed at UC Berkeley.

Comment: The last thing, which is the most important deficiencies of the five deficiencies at the end?

Response: Liquefaction of the dam is the biggest problem. It is also the most expensive to correct. If the rest of the dam were as weak as the one hole demonstrated, it would be very expensive to cure and may even require taking the dam out and recompacting it.

Comment: Do you take into consideration in determining that the dam is unsafe the chances of an earthquake, the chances of PBA, the chances of water being there, the chances of being in high water times, winter high water; take all that into consideration and come up with a figure like 1 and 100,000 and apply that to some risk analysis, or just say, well, 0.9 and 0.7 and therefore it's unsafe?

Response: No, we don't do any kind of odds playing like that. We go strictly by what's in the California Water Code, and that prohibits the Department from allowing an unsafe dam to exist. Since this dam is subject to failure during an earthquake, it's classified as an unsafe dam. The Department must comply with the Water Code, so it must take action to either have the deficiencies corrected, which is the preferred alternative, or revoke the Certificate of Approval.

Comment: How do we challenge a decision by somebody we don't even know who made it or what's going on, that it's totally unsafe?

Response: We would discuss it with any engineer which you hire.

Comment: I have a question in regard to something I don't know about and is sort of interesting. When was the last time there was an earthquake in this area or has there ever been one here?

Response: Earthquakes are not capable of being predicted. The fact that several major faults exist within close enough proximity to cause sufficient shaking in the area to possibly cause liquefaction of the embankment is sufficient to assume that there is a problem.

Comment: Are you basing all your implication factors on $CH_2M$ Hill's one test, one test cone? Did you do any testing yourself?

Response: The Department didn't do any testing itself. $CH_2M$ Hill, the consulting firm, concluded that, based on what they found at that one site, the dam is subject to

liquefaction under fairly low levels of seismic shaking. The Department's contention is that more than just that one test hole should be drilled in order to determine the structural soundness of the entire embankment and not just that one spot.

Comment: Second question: if they want it tested, why do they not pay for the cost of it rather than we prove that it's stable? You prove that it is unstable.

Response: Again, the Water Code directs the Department to require owners of dams to make all necessary tests.

Comment: Isn't that kind of against our laws? In other countries, you have to prove your innocence; in this country, they have to prove you're guilty. This doesn't seem to go along with that.

Response: It's a different situation where safety is concerned. The Legislature developed the Water Code. This legislation directs the Department to ensure that all dams in the State of California are safe for their designated purposes.

Comment: I would like to know why the government paid for the surveying of Cottonwood Dam and for flooding and everything, yet they won't come in and pay for our surveys and stuff. Is it because we are privately owned and not government? They spent a lot of money, then all of a sudden put it on the shelf, when we could be using the money to help the people around here. I'd like to know is it because it's not government owned and it's privately owned? Which it isn't now; it's community owned. What is the difference between the two dams, when there was no dam at all?

Response: Any dams that may have been developed on Cottonwood Creek would have been paid for by the beneficiaries of that water - the downstream water users.

Comment: The surveying and everything was done by the government, all of it. Because they came up and took samples of our mountain and everything else, and

the government paid and it was a lot of money. We're not talking just pennies, like we're talking for our surveys. I mean we're talking, you know, it could be up in the millions. The same agency could say, well, we're going to put it on hold and put it on the shelf. We could be using that money to help our community. Isn't there some way we could dip into that fund since we're so close to Cottonwood? It would be more flooding for your area. I'd like to know why we can't get into that government money that's sitting on the shelf waiting for more problems.

Response: Both the federal government and the California Department of Water Resources have been involved in water supply studies in the Cottonwood Creek drainage, but that is paid for by the water users. If this community wanted to contract with the federal government or Department of Water Resources to develop a water supply, I suppose that could be done.

Comment: Well, what is the cost that we're looking at?

Response: A couple of hundred dollars per acre-foot, I believe, would be the cost of water generated from the Cottonwood Creek projects.

Comment: This is in regard to the court decision: when and where will the revocation be held?

Response: I don't believe that decision's been made yet. At the previous meeting, the last meeting we had in March of 1988, it was mentioned that we would try to hold the meeting in this area. But that decision really hasn't been made yet.

Comment: Are there any statutory requirements for the window of time after you issue the final report?

Response: No, there are no requirements.

Comment: On page 11, it states that you allowed Mr. Schreder, if he came up with emergency actions plan, you would allow him 2 to 5 years of storing water while he

came up with a plan and took action to get the results. Would you be willing to offer us that same consideration?

Response: Something to that effect. That's what we talked about today. We would like a proposal from your people on what you can do. I don't know about two years, though, if we've been giving you deadlines and you haven't been giving us results, or rather the predecessor company hasn't. I think we've seen a lot of action here, positive action, and we would like to get a proposal down. We want to finish up the EIR, but there is no direct connection between the two. There is no law that ties these two together.

Comment: What is the time frame for getting the proposal together? Is it before the final report?

Response: No, but we do need to do something in weeks or months, but not in years, or what have you. We need to do something this winter, preferably by the first of the year.

Comment: I would think, if I could interject on that, mainly as the Board acts with the meeting that we did have, and discussing the scope of what they are looking for is something that is going to be on the immediate agenda at our next Board meeting and it is going to be addressed.

Comment: You said that we should apply for some grants to repair the dam. And, also, I wanted to ask you if we are eligible for some grants to organize this water system? Because right now, we are wasting a lot of water, and there will be more people that benefit from that water and that money that would come in that was from limitations.

Response: Sure, the grants are available to develop and maintain water systems, which may include building dams or water supply rehabilitation, canals, installing plumbing, water treatment plants, or other various purposes .

Comment: I have a question for you. Why are you picking on our little dam when Shasta Dam is on an earthquake fault? You might as well just clean out the middle of the State if that one breaks. But if this one breaks, it's going to wash away one little cabin.

Response: There's been no indication that there are any structural problems with Shasta Dam, so it's not important.

Comment: What happens if you get one large earthquake by Shasta Dam and it breaks? You'd have a big world of problems then.

Comment: How many more studies and surveys are there going to have to be made on this project?

Response: What is required is an engineering evaluation to determine exactly what are the structural deficiencies of the dam and spillway, and develop suitable methods to rectify those problems.

Comment: Is that the only one?

Response: That's it.

Comment: What do you, how much will you spend on that survey or that study?

Response: The Department cannot be involved in that. The Igo-Ono Community Services District will have to contract with an engineer to make those studies, and then the Department will review and hopefully approve the plans to rectify the problems.

Comment: I have a question dealing with the risk analysis that was asked over here, and the question deals with the safety of the dam. Is the dam unsafe because it may fail or is it unsafe because if it did fail, there would be damage downstream?

Response: It is unsafe simply because it may fail.

Comment: It doesn't matter whether there's any problems downstream?

Response: No.

Comment: I'd like to go back to this earthquake thing. I'm a geologist and I've worked in this area for many years, and I know of no indication of faulting or earthquake activity in this part of the country at all. There are no major faults that have any impact on this thing. When you look at this table on page 46, and there are only two of those faults, that's the Mendocino Fracture Zone and the San Andreas Fault, that are known to be active, and they are not a real effect in this area. The ground accelerations depended also on the type of bedrock. This dam sits on granite. It's solid rock. There is no evidence of any recent movement, more recent than that. There aren't any faults, and I think it is coincidental that the remarks match the MCE (Maximum Credible Earthquake), and almost all these zones, five out of eight of them, are 7.5. The idea of the concept that the dam is unsafe due to the earthquake potential, regardless of the kind of material the thing is made of, and I don't think that this document adequately addresses the geological aspects of this thing. Don't you people have access to, say, your Department's mining geology and the people there? How come they haven't looked at it? They got countless people that do know something about dams.

Response: The Department of Water Resources also has competent geologists and engineers. This information all came from published sources. It's in the literature and commonly accepted.

Comment: Well, I had a great deal of difficulty finding some of this stuff in the published literature, and the major conclusions you've referenced with internal documentation that is inadequately documented. You have to do better than this with the final report.

Response: The evidence that we have shows that the dam is unsafe.

Comment: I would like to bring up a comment. One of the reasons our area was targeted as a toxic waste facility and dump was the fact that we didn't have earthquakes, and I just thought I'd bring that up.

Comment: I thought that the report was very good on the animal habitat and so forth. This is very important here. People drive from Redding to come out here and look at the animals and jog, and do all kinds of things, ride bicycles. Not just this area, the whole mountain, the whole community. I think that the problem with the report that I see here, it's just something that I can't swallow that somebody can take another person's property in this country without a hearing. If somebody would have cited that this thing was unsafe with very little evidence, and we got the opportunity for us to present evidence to the contrary. And all of a sudden someone said the dam is unsafe and all of a sudden everybody's property is going to be taken away without a hearing, without anything, and if we can still show some way, scientific evidence, whatever, that it is not unsafe, then I think that's fine. Maybe that's what you're saying, that we have the opportunity to do this.

Response: Yes. Maybe we should make that clear, particularly on the question of the earthquake safety. We know that one hole is not adequate to judge the safety of the dam. The dam could be better than what that hole shows. We thought we had a good understanding with Mr. Schreder so that we would get a good evaluation of the dam. It takes more than just one test hole. I've worked on lots of evaluations, including the ones that had major problems, and we did pretty well on studies like this. They predict this behavior quite well. No, you need several holes drilled in a dam like that to make an intelligent judgement.

Comment: Then will you make that same intelligent decision that it is unsafe by going back and doing more testing, besides one place?

Response: The idea is that you'll hopefully line up the money and get someone to do more work, and we will review that engineer's work and conclusion.

Comment: Are you saying the community has to go through the extra expense and

time of doing more than one testing to show the dam is safe when you can determine that in one testing it is unsafe?

Response: No, I'm saying that we have to say that the dam is unsafe. Our job is to protect the people and the State, all of you included, from dam failure. The dam was built by hydraulic fill methods, which we know is very vulnerable. Seventy thousand people were evacuated below a hydraulic fill dam in Los Angeles after an earthquake. It was a very close call. That was about the third dam of that type that was severely damaged in an earthquake, so that type of dam is suspect. The one hole that has been drilled confirmed that it is vulnerable. The center of the dam is vulnerable; we're not too sure about out under the slope. That could be stronger material.

Comment: I think what we'd all like to know since we all pay taxes, why do we have to pay for this? You're trying to take our dam away from us; why don't you find out if it's not safe? We're paying for it anyway through our taxes. Why do we have to foot the bill to prove that it is safe? I don't understand. I mean this question's been asked three of four times now and I haven't heard an answer.

Comment by Chereen Beck (Administrative Assistant to Senator Jim Nielsen): This problem was brought to us about two years ago by Bob Bosworth working with the former owner. The problem, of course, at that time the District was not financially able to do the engineering studies to find out what it would cost to repair the dam. That was before we realized there was this earthquake problem, although that may have been in the work at that time. Working with Bob Bosworth, the Senator did put in a spot bill, which is a bill that holds it's place in the Legislature so that if something develops from this, and you need financial assistance, then we could go ahead and proceed and not miss all the time lines that the Legislature requires for legislation. So, that bill was in the Legislature last year. We still have been working with Bob and Larry and Jerry and the Department of Water Resources, who have always been very cooperative with the Senator because he is very knowledgeable and articulate about the water problems in his district. We will, and he has confirmed this, put in another spot bill that's coming here, if necessary, for

legislation to assist this District.

Comment: Are you gentlemen interested in helping us keep our dam?

Response: The Department would much rather see you keep the dam and your water supply than to have to revoke the Certificate of Approval .

Comment: Would you extend as much energy to help us get a grant as you are to condemn our dam? That would simplify it, wouldn't it?

Response: We are identifying various loan and grant programs that would help you solve these problems and will be providing that next week to Jerry and Larry.

Comment: I would like to interject from my standpoint, and again this goes back to the meeting we had today and the previous meeting. Cheri Beck said it quite well there, and Larry Preston and Bob Bosworth. I think the report speaks for itself quite well. These gentlemen, I think the last thing on their mind is to revoke or tear that dam down. But it is a problem that has to resolved. Unfortunately, we are stuck with a system that requires us to go through these steps. And this is the legislative process that we have to go through. I think that with everybody's cooperation, and write these letters, don't just leave here tonight, grab that sheet back there, write your Congressman, your Supervisor, and everybody else and speak up. These people, I feel I have every reason to believe, that they are our friends and not our foes. I hope you can see that there is definite community concern and interest here. I volunteer my whole family to do whatever they can. So to solve the problem, you will give us time to do it?

Response: That's great. I'm very glad to see you care and we're very happy to work with the community to solve these problems.

Comment: I wanted to address this to Senator Nielsen's representative. There is currently in the billions of dollars going to San Francisco right now to repair the damages for the earthquake that just occurred. It would seem to me to be cost

effective to pay for a dam or fund a dam before it was destroyed because what I'm looking at, if the dam were destroyed by an earthquake, the State would rush in and offer replacement costs and here all we're looking at is tending to the dam before an earthquake would destroy it.

Comment: Can I say something? This lady back here was talking about Cottonwood Dam and we pay our taxes to take care of the dam. Yet the State went in an engineered the whole project without one cost to the home owners. Why wouldn't they come in and engineer this or have the Army Corp of Engineers come in and fix it?

Response: The cost of the dam is proportioned among various benefits. Part of the benefit of a dam on Cottonwood Creek would be flood control. This benefit would be paid by the beneficiaries or tax paying public. Other benefits of the dam are water supply. The cost of developing this water supply is paid by the water users.

Comment: So, it was mainly to supply water for Southern California?

Response: They're the water users that would be paying for it .

Comment: Right, but did they go in and pay for the engineering?

Response: Those costs are also reimbursed by the water users.

Comment: Why can't we do that then?

Response: You could, but the water would probably be very expensive. The water users pay for project water at something like $200 per acre-foot.

Comment: No, I'm saying the engineering. Put it on a cost plan. Let the State pay for the engineering and we pay a certain percentage back, or something like that.

Response: Again, it's the water users that pay for the engineering. The water users

are the people, the agricultural users. The State water users, primarily Southern California and Bay area, are paying $200 to $300 an acre-foot for that water.

Comment: I understand that. But what you're saying is that we have to engineer it and prove to you what has to be done. Why cannot the State do that and then we pay a percentage back, same as your paying your taxes, only we'd have another tax with the State?

Response: If the area contracted with the State, then it would be possible we could come in and do something like that, but it would be pretty expensive water. You would then have to pay for the water you use at $200-$300 per acre-foot.

Comment: Does the Army Corp of Engineers come in and do that in a disaster area? Does the federal government come in through the Army Corps of Engineers to establish, say, six dams? Would they come in and do this one as a disaster area?

Response: Unfortunately, not until after a disaster. We just were working with them in the last two weeks on the earthquake in the San Francisco area. They can only fund repairs for emergency purposes.

Comment: This may be somewhat premature, but in as much as you now know about additional funding sources, is there any chance that we will be competing for some of the bailout money for San Francisco?

Response: I don't believe so. There are proposals being made on how to fund that money for the area through various tax increases and what not. I don't know whether or not you will be competing for the funds that the people down there might also be applying for. There are grants for rural areas for developing or improving their water systems. I think that does exclude areas like that from applying.

Comment: Somebody complimented you earlier on your list of wildlife. I'd like to challenge that compliment. It appears to me that what you did is got a list of species

that might be in the area and included that in the EIR or was there an on-site investigation?

Response: No, there was no on-site investigations. The process doesn't require on-site investigations. We went to habitat maps to determine what types of habitats are in the area and that included what type of animal species could utilize the habitat, and we also had input from the Department of Fish and Game in developing that list.

Comment: I took quick notice to see that there was nothing on there that is endangered, but there are some omissions that I think you should be aware of. I'm going to give you one example, but the rest I don't know whether I ought to give you the examples because it's kind of like feeding your falcon without wearing a glove. In other words, if we tell you the inadequacies of the draft report, then you're going to make it adequate and come back to us with an adequate final draft and I don't think that's really our job. I think it's your job to do adequate on the EIR. And in the course of doing that, I think you should have. But the beaver. There is a lot of beaver in the water and they certainly would be impacted. I think anybody that's from the area will tell you that that's true, and that it was not mentioned in the report. I only gave that example because there are some omissions. There may be others.

Response: Yes, you're very right. Thank you for offering that one that was missed. The California Environmental Quality Act doesn't require an EIR to be perfect. It just requires the best efforts and that is what we are trying to do here. We're not trying to hide anything. We're trying to include as much information as possible in an informational document to be used to point out the importance of the area.

Comment: I have a question. Has there been anything done to stop permits being brought, say if I wanted to build a house in the flood area, so that people can't make this thing worse, by building in the danger area zone?

Response: That's up to the county to regulate.

Comment: Has the county done anything about it? Has the State told the county to do something about it?

Response: I'm not aware of any regulation that the county has imposed on the developers.

Comment: If people get into that area and further complicate matters, that's going to make it worse, right? I would think something should be done by somebody.

Response: There is no map that defines the area that would be flooded as the result of this dam failing. So there is no area to regulate. We do have flood maps that are put out by the federal government to regulate the development in those.

Comment: I understand that they're not going to declare this problem as bad as the San Francisco disaster or anything. But the entire State is looking at paying to restore San Francisco back. What's not to compare this with that? Because that's a real disaster? But what's the difference? You're talking about a small community out here. Why do they say the entire State has to pay for the San Francisco deal via a tax and yet we have to foot the bill for this here?

Response: Again, that's not our choice. The Water Code requires that owners of the dam make those evaluations to ensure that it is safe to impound water. We can't make any determinations like that to determine who pays other than the owner of the dam. We don't have that authority. It would be up to the Legislature, if they chose to take action like that.

Comment: If we take a test up there to prove it to the point that the dam is good and we've got the money to prove it, is that the idea rather than you prove it's unsafe?

Response: It's up to the Igo-Ono Community Services District, as the owner of the dam, to determine that it is safe, and submit an engineering report to the Division of Safety of Dams for evaluation.

Comment: You're basing your entire evaluation on an earthfilled dam that has failed near the San Andreas fault, and comparing that to this location here and an earthfilled dam, and putting them both in the same critical position. Is that the point, you have nothing except the fact that it is an earthfilled dam?

Response: I think that the point was made that several dams with similar construction have had problems over the years.

Comment: Not in this area. On the San Andreas, Hayward, and so forth, but not in this area.

Response: One of them was in Santa Barbara, and I think that's about an hour from the San Andreas fault, as you are here.

Comment: I got a question. Who paid for the initial survey that determined the dam was unsafe?

Response: The prior owner of the dam hired a consultant that took a core from the dam, and their conclusion was that, at least in that area, the dam was subject to liquefaction.

Comment: Ok, so somebody that doesn't even own the dam now is inferring that we have to spend money to prove that it is safe.

Response: The core that was done wasn't sufficient to determine that the dam was safe. In fact, work had been done that showed that there definitely are problems with the dam and that more work is needed to show that it is safe or to determine what repairs need to be made to make it safe.

Comment: We're not denying it's unsafe. I mean, it's all we got is problems with it. We have to foot the entire bill to prove that it is safe. Doesn't make any sense to me. I mean the dam's been there for I don't know how many years now, longer than I remember and probably longer than I've been alive.

Response: The only way I can answer that is to keep reiterating that the Water Code directs the Department to direct owners of dams to make evaluations that are sufficient to satisfy the Division of Safety of Dams that the dam is safe. I think it's something like the smog device on your car. You don't take that to the State and say test my car, I want to sell it. It's just the way the law is written. The State tells you in order to sell your car, you have to do it.

Comment: Yea, but that's already done. You can't get it registered without that.

Response: It's a similar thing. We would look at the Certificate like a car registration. Very much like the pink slip on your car.

Comment: But wouldn't the State have to tell you, if it was a house, they would come out and tell you to bring it up to code and specifically what has to be done. You're not telling the people what specifically has to be done and I would think that would be your responsibility.

Response: I agree, but that's different. You're right. It's just the way the law was set up. The City of Los Angeles owns a dam and maybe the rest of the State ganged up on the City of Los Angeles and said you'll do these things. I don't know. It was in 1928, a couple of years before I was born, and it's been that way for sixty years now, but this is the way it's been handled. For example, when Rainbow Water Company owned it, that was private property and I think the tax payer would have questioned State money being spent on Rainbow Water Company, which was owned by four people. You would have tax money going into a private dam, and more than half the dams in California are private; I think about three quarters are. I understand what you're saying, but that's the way the law is and we understand that that's very unfortunate, but that's the way it is.

Comment: For Jerry Vossen. Jerry mentioned at the beginning of the meeting that there was a meeting out at the dam site and had a positive heading. Could you brief us on that? And at our last meeting, we were looking at hiring an engineer to help our case and involve in the studies of the possibilities of what it would take to

renovate the dam to comply with the dam safety. Where are we with that?

Response by Jerry Vossen: Basically, it was agreed that these gentlemen and our Board of Directors, that when we were all available, that we met up at the dam for about one and a half to two hours this afternoon. At the last meeting, as you know, we had entertained a proposal by Kurt France, France Engineering. Mr France accompanied us this afternoon to be part of it, even though we have not taken affirmative action to hire him as of yet, because we'd have to go through the proper notice, and we'll take care of that at the next meeting. But he wanted to be abreast of the meeting and I thought it was in the best interest of all of the Board to meet Mr. Bennett and Mr. Babbitt. Mr. Bennett was up here last spring and we basically got a feeling what were their major concerns, what their priorities are, and we discussed basically they are going to be willing to respond when Mr. Boles provides us with a list of possible grants and funding available. It was very, very positive. If we can show the same progress that we have shown in the last 12 to 18 months, and come up with a plan, and we may even see action. I'm not promising. They've been let down before and it's just got to the point where we have to take some positive steps and we will be addressing that at our next Board meeting. It will be posted.

I would certainly hope that it could be a tremendous vote of confidence if we could get a turnout like this at our Community Services meeting. The next meeting will be on the 15th of November. If in fact we would anticipate this turnout, this may assume that we would not be able to hold it where we normally do, which is in the Science room at the Igo school. Could we get a show of hands here, whatever. People who anticipate a turnout of this size, we would have to meet up here again. Well, technically we could meet in the multipurpose room and pull out chairs. The reason for the changing of the meeting site is that, as you know, we are getting into the winter season and, without all this body heat and without all these people, this hall can get pretty cold when there's just a few of us in here. So the school does have central heating and we would like to have it to accommodate the number of people that do show up. At the school, as you know, the one inconvenience that we do have is the small chairs and desks. We can stretch out here a bit more and would like to have people rather than comfort. Could we have a show of hands of how

many people could feel that they could put this on their agenda and calenders and come out? Thank you. The meeting, then, is November 15th in Ono Hall, the Grange Hall at 7:00 on Wednesday the 15th. We are a new owner of this dam and we are going to take longer and we are sure you are going to allow us time to organize and to do something about this. I mean, we've inherited something that's been going on for over 20 years and we would like as much time as we could possibly have. We would like to know if we can impound water here or what. What can we expect? I can say that there were a few that really worked their hearts out last spring, trying to get the ditch cleaned and rubbish burned off the ditch, and we have several people here tonight that made a lot of difference in that dam and that ditch.

I've got a request. It's probably more for the dams people than for the Board. I was wondering if we could receive equal consideration that was given Mr. Shreder in that it allowed him to fill the lake to 60 feet when he supposedly was going to do repair work on it, so that we would have the right to have some more water to sell to generate revenue to help affect the repair costs? Things can't be that much different than a couple years ago.

Response: We'll talk about that. You understand that you have safety to consider and you're getting going on that.

Comment: I think that if we assist not to lose water, and we distribute the water and not lose the water to all kinds of gopher holes or to people who do not pay for the water or whatever; if we have a system where we wouldn't waste any water I think then we would have plenty of water and we would have a good revenue. But we have to have a good system.

Response: I think that's what your Board of Directors is trying to work with: to improve the system to make available water supplies go much further than they have in the past.'

Comment: I'm sure all of us thank you for your interest and your time. It's a

problem and we understand that you have a problem and you really don't have a choice or alternative to offer us, and we thank you for that.

Response: I would like to strongly encourage anybody that would like to make written comments to go ahead and send them to us, Department of Water Resources, in Red Bluff. We realize that this system is very important are we're really appreciative of any comments that you wish to make. Thank you all for coming here tonight.

# APPENDIX C

## COMMENTS RECEIVED ON THE DRAFT ENVIRONMENTAL IMPACT REPORT

The Office of Planning and Research submitted the Draft Environmental Impact Report to selected State agencies for review. None of the State agencies had comments.

Several legislators and citizens submitted comments on the Draft Environmental Impact Report. Comments and responses are presented in the following pages. Additional information presented in the responses has been incorporated into the Final Environmental Impact Report.

STATE OF CALIFORNIA—OFFICE OF THE GOVERNOR

GEORGE DEUKMEJIAN, Gover

OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET
SACRAMENTO, CA 95814



November 16, 1989

Gerald Boles
Department of Water Resources
P.O. Box 607
Red Bluff, CA 96080

**Subject:** DEIR on Revocation of the Certificate of Approval for Misselbeck Dam and Reservoir, SCH# 89092633

**Dear** Mr. Boles:

**The State Clearinghouse submitted the above named environmental document to selected state agencies for review. The review period is closed and none of the state agencies have comments. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.**

**Please call Loreen McMahon or Nancy Mitchell at (916) 445-0613 if you have any questions regarding the environmental review process. When contacting the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.**

**Sincerely,**

**David C. Nunenkamp**
**Deputy Director, Permit Assistance**

PLEASE REPLY TO

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(916) 445-3353

DISTRICT OFFICE ADDRESS
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650 IMPERIAL WAY
SUITE 103
NAPA, CA 94559
(707) 253-7212

50 SANTA ROSA AVENUE
SUITE 305
SANTA ROSA, CA 95404
(707) 571-1909

2400 WASHINGTON AVE.
SUITE 120
REDDING, CA 96001
(916) 225-2201

# California State Senate

COMMITTEES:
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APPROPRIATIONS
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STATE ALLOCATION BOARD

APPENDIX C

**JIM NIELSEN**
**Senator**
Fourth District
Butte, Colusa, Glenn, Lake, Napa, Shasta and
Tehama Counties and a portion of Sonoma County

November 9, 1989

Mr. Wayne Gentry, Director
Northern District
Department of Water Resources
P. O. Box 607
Red Bluff, CA 96080

Dear Wayne:

I would like to thank your agency for holding the public hearing on the Misselbeck Dam on November 2, 1989 at the Ono Grange Hall in Ono for the benefit of the community and other interested parties. My Administrative Assistant, Cheri Beck, was able to attend and gather information and make a few comments on my behalf.

In reviewing the draft EIR and reflecting on the community's concerns, there are some points that I would like to see expanded and others included in the final EIR.

1. I believe the final EIR should reflect the current ownership of Rainbow Lake and Misselbeck Dam and the impact such ownership has on liability should the dam fail. Because the ownership has changed to a public entity, rather than a private owner, the various funding options for assistance for repair, replacement and engineering studies of the dam should be identified and delineated.

2. Since questions have been raised as to the likelihood of whether or not this dam would fail during an earthquake, the department should provide more detailed information on the studies they relied on to come to this conclusion.

3. The impact on fire protection services needs to be expanded and the ratings studied and included in the final version of the document. The California Department of Forestry appears to be the only means of fire control in the area and the impact of the loss of water for fire suppression purposes needs to be emphasized to a greater degree.

4. Should the dam fail, the flooding impact on residences is shown to be minimal based on a 1981 U. S. Geological Survey map. As there has been some growth in the area since then, according to the Community Services District, a more updated survey should be taken and the results included in the final report.

I appreciate the effort your department has put forth in addressing this important problem. I am sure you will receive additional comments from some of the 150 people who attended the meeting. I am hopeful that their concerns will be addressed in the final document and that the Division of Dam Safety and your agency will continue to work with them to help resolve the issues brought forth on the future of Rainbow Lake and Misselbeck Dam.

Sincerely,

JIM NIELSEN

cc: Jerry Vossen
Bob Bosworth

APPENDIX C

Response to comments of Senator Jim Nielsen:

1. The Draft Environmental Impact Report was prepared prior to the Igo-Ono Community Services District (IOCSD) becoming owner of Misselbeck Dam. The Final Environmental Impact Report reflects this change in ownership. Liability for failure of a dam rests with the owner; the IOCSD now has the liability for maintaining Misselbeck Dam in a safe condition. Funding opportunities for repair, replacement, and engineering studies have been provided to the IOCSD. These low interest loan and grant programs are also discussed in the Final Environmental Impact Report.

2. As discussed in the Draft Environmental Impact Report, damage caused to the Lower and Upper San Fernando Dams (both hydraulic fill structures) due to an earthquake in 1971 prompted the Department of Water Resources to require other owners of hydraulic fill dams to conduct engineering evaluation of seismic stability. The Rainbow Water Company contracted with $CH_2M$ Hill, Inc. in 1986 to conduct limited geotechnical evaluation of the embankment of Misselbeck Dam. Prior to conducting this work, the Rainbow Water Company was notified that the limited exploration program did not constitute a complete geotechnical evaluation. Following drilling and sampling of the embankment, $CH_2M$ Hill, Inc. concluded that "if the Standard Penetration Test results from our boring are representative of the general condition of the embankment, it must be concluded that there is cause for concern regarding the low relative density of the sands, especially in the top 45 feet of the dam. This condition is of concern because under seismic shaking, such materials may contract and liquefy. Our analysis indicates the core materials may be subject to this problem under low levels of seismic shaking." $CH_2M$ Hill, Inc. recommended further studies to determine the condition of fill materials in the outer portion of the embankment and preliminary slope stability analysis. These studies have not been conducted. The Department of Water Resources, upon reviewing the $CH_2M$ Hill, Inc. report, concurred that the embankment is susceptible to liquefaction under fairly low levels of seismic shaking at any water storage level. In view of the potential for embankment liquefaction, the inadequate spillway

hydraulics, the deteriorating spillway lining, and the increasing potential for sediment to plug the outlet (which did occur in December 1989 and January 1990), the Department issued an order to the Rainbow Water Company on November 13, 1986 to submit a schedule by February 1, 1987 for making geotechnical, hydraulic, and structural studies of Misselbeck Dam, spillway, and outlet works. The Rainbow Water Company failed to comply with the order, and stated that funds were not available to conduct this work. The Department, therefore, began the process to revoke the Certificate of Approval.

3. The Public Resources Code provides fire ratings based on fuels, weather, and topography. The Igo-Ono area south of Platina Road is rated as high fire danger due to hot dry summers, and largely grass covered rolling hills. The area north of Platina Road is rated as very high fire danger due to the steeper topography, and denser growths of brush and trees. The presence or absence of Misselbeck Dam does not affect the fire rating of the area.

Fire protection services are provided to the area by the California Department of Forestry, with fire stations located within 8.5 miles in Ogo and 16 miles in Redding. Volunteer fire departments provide additional protection, with stations located in both Igo and Ono.

The fire history of the Igo-Ono area is one of minimal fire occurrence (Chris Newton, CDF, pers. comm.). Use of water from the canal for fire protection, therefore, has been minimal. In addition, the Department of Forestry cannot easily refill fire engines or tankers from the canal due to the shallowness and remoteness of much of the canal and laterals. Ponds maintained by the canal may be used for a water supply to fight local fires, but water tankers would usually be available to provide additional water to fire engines. Additional water is available from a water tank located at the intersection of Platina and Cloverdale Roads near Igo. The main effect from loss of water storage behind Misselbeck Dam would be the loss of a helicopter reloading area from the reservoir for fire control in the Bully Choop area to the northwest.

4. The area downstream from Misselbeck Dam was surveyed from a helicopter during November, 1989. A recently constructed road and bridge across the North Fork of Cottonwood Creek used for logging access lies between Misselbeck Dam and Hoover Dam. Another road providing access to summer cabins west of the reservoir emanates from the dam embankment, and crosses below the spillway. Three apparently abandoned cabins were identified within two miles of Misselbeck Dam. Two active ranches were identified adjacent to the North Fork of Cottonwood Creek within 2.5 miles of the dam. One of the ranches was a house, while the other was a mobile home. Both ranches contained numerous vehicles, outbuildings, and other improvements. A third homesite identified on the 1981 U. S. Geological Survey map was found to be demolished. However, the foundation of a house under construction was found about 3 miles downstream from the dam. While the partially completed residence may be located sufficiently above the streambed to avoid damage from failure of Misselbeck Dam, the other two ranches would definitely be affected. Other residences located further downstream were found to be as described in the Draft Environmental Impact Report.

The amount of downstream damage from dam failure would be dependent upon the degree of involvement of the embankment and amount of stored water. Both roads and the bridge immediately below the dam would probably be damaged. The two ranches within 2.5 miles of the dam are highly likely to suffer damage due to their locations adjacent to the stream in a relatively narrow canyon. Anyone using the roads and either living or working at the ranches would be affected. Others working or recreating in the flood plain may also be affected.

The Water Code directs the Department of Water Resources to require owners of unsafe dams to correct deficiencies or remove such dams from service, regardless of the possible extent of downstream damage. The Department is directed to consider the possibility that a dam may be endangered by seepage, earth movement, or other conditions which may exist in the vicinity. When conditions occur that may endanger a dam, the Department must order the owner to perform evaluations to determine the structural integrity and perform repair work. The owner has the option of complying or removing the dam from service. Removal of all residences

and designation as a flood plain downstream from Misselbeck Dam would not alter the requirement of the Water Code that the Department take action to require either evaluations and repair of the dam, or removal from service.

WALLY HERGER
2D DISTRICT, CALIFORNIA

PLEASE REPLY TO:

☐ WASHINGTON OFFICE:
1108 LONGWORTH HOUSE OFFICE BUILDING
(202) 225-3076

DISTRICT OFFICES

☐ 20 DECLARATION DR., SUITE B
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(916) 893-8363

☑ 2400 WASHINGTON AVE., SUITE 410
REDDING, CA 96001
(916) 246-5172

☐ 951 LIVE OAK BLVD., SUITE 10
YUBA CITY, CA 95991
(916) 673-7182

# Congress of the United States
## House of Representatives
## Washington, DC 20515



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OCEANOGRAPHY



December 5, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
P.O. Box 607
Red Bluff, CA 96080

Dear Wayne:

My office has received a great deal of correspondence with regard to the Misselback Dam and Reservoir.

Although this is a State matter, I am interested in the proposals under the Draft EIR and the ramifications of such recommedations upon those who currently depend on Misselback for a variety of water uses.

I urge you to review the EIR, study alternatives and investigate funding sources before you proceed with any specific action. Many important points have been raised which I believe deserve review. I have enclosed letters which outline these concerns and would appreciate you keeping my Redding office advised on the status of Misselback Dam.

Thank you in advance for your attention to this matter. I look forward to your reply.

Sincerely,

Wally

WALLY HERGER
Member of Congress

WH/pp
enclosures
cc: Senator Jim Nielsen

Response to comments from Representative Wally Herger:

The purpose of the Environmental Impact Report is to provide information to the Department of Water Resources on the effects of revocation of the Certificate of Approval for Misselbeck Dam. The Environmental Impact Report includes discussions of alternatives and funding sources. This information will be fully considered by the Division of Safety of Dams during the process of determining whether the Certificate of Approval for Misselbeck Dam should be revoked.
We have reviewed the letters, which are duplicates of those we received directly. Responses to comments in the letters are included elsewhere in this report.

Marvin Peterson
Superintendent/Principal

APPENDIX C

# IGO-ONO-PLATINA UNION SCHOOL DISTRICT

DRAWER A • IGO, CALIFORNIA 96047 • (916) 396-2841



November 6, 1989

Mr. Wayne Gentry
Department of Water Resources
2440 Main St.
P. O. Box 607
Red Bluff, CA 96080

Dear Mr. Gentry:

On behalf of everyone involved with the Igo-Ono-Platina Union School District which includes the Board of Trustees, staff, students, parents, and community, I am soliciting your continued support in trying to positively resolve the Misselbeck Dam problem to everyone's satisfaction.

I attended the meeting on Thursday night, November 2, 1989, at the Ono Grange Hall and left with the feeling that the matter could be resolved positively if the Igo-Ono Community Water District implements your suggestions. Along with your suggestions, I noted a willingness on your part to assist the water district as they pursue loans or grants.

I believe that if the Misselbeck Dam is closed down it will have a devastating effect on the Igo-Ono School for several reasons:

1) Loss of enrollment - Water from the dam is used for both agricultural and domestic purposes.

2) Water Table - Water in our area is hard to come by. Our well could be adversely affected. If the dam was upgraded, we would even consider putting in a turf area for the students.

3) Fire Suppression - Even though we try to keep our well tank full, 6000 gallons doesn't go too far and being able to take water from the ditch across the street could make a big difference.

As you know, the quality of life in the Igo-Ono area would be dramatically curtailed should the Misselbeck Dam be closed down. Hopefully, all issues can be resolved positively.

Sincerely,

Marvin Peterson

Marvin Peterson
Superintendent/Principal

copy: Bob Bosworth
Wally Herger
James Nielsen
Stan Statham

**Response to comments from Mr. Marvin Peterson:**

1. As discussed in the Environmental Impact Report, the loss of stored water during years of normal runoff would not significantly affect the ability of the Igo-Ono Community Services District to supply water in quantities that have been delivered since 1982. Data are not available, however, to determine the amount of water available during severe drought or consecutively dry years. While the District has historically experienced water supply shortages, lack of storage behind Misselbeck Dam may exacerbate supply problems in dry years. Some residents dependent on water from Misselbeck Dam during dry years for agricultural and domestic purposes may leave the area due to the lack of a dependable water supply. The loss of these residents may, indeed, result in some loss of enrollment, and thus funds, in the Igo-Ono-Platina Union School District.

2. The Environmental Impact Report discusses the importance of canal leakage on ground water recharge. While most of the Igo-Ono Community Services District lies outside of the water-bearing Redding Ground Water Basin, the school, located in Igo, is very near the western edge of this basin. However, non-water bearing deposits are on or near the surface in this area, so that ground water from the basin may not be available. As with other wells in the water district, the school well may depend on canal leakage for recharge. Loss of storage during dry years which reduced the water supply may affect yield of the school well.

3. The availability of water in the canal may enhance fire fighting capabilities if the canal near the school was of sufficient width and depth to allow drafting by fire engines. Water would probably be available in the canal in most years even without stored supplies from Misselbeck Dam. However, water may not be available in the canal during drought years unless augmented by stored supplies. General fire conditions can be expected to be most severe during drought years, which increases the value of stored water to maintain flow in the canal and filling of local ponds. Water for refilling of fire trucks is available from a water tank located at the intersection of Platina and Cloverdale Roads about 2 miles south of Igo.

**RAINBOW WATER COMPANY**
1029 K Street, Suite 26
Sacramento, Califonia 95814

APPENDIX C

November 21, 1989

Gerald Bales
Department of Water Resources
2240 Main Street
Red Bluff, CA 96080

Dear Mr. Bales:

Thank you for the opportunity to respond to the draft E.I.R. regarding Misselbeck Dam.

My comments are as follows:

1. The Rainbow Water Company no longer owns the Water Company. It was purchased by the Igo-Ono Community Service District last April for one dollar ($1.00).

2. The Public Utilities Commission has approved this transfer.

3. The Report sites no action on the part of Rainbow Water Company to address the deficiencies of the Dam. The Rainbow Water Company took significant action to address Dam deficiencies. We worked with four engineering firms including:

   A. Raymond Vail and Associates
   B. $CH_2M$ Hill
   C. Kleinfelder Engineering
   D. Energy Engineering Inc.

   The Rainbow Water Company spent over $40,000 on studies, none of which satisfied the Department of Water Resources.

4. References are continuously made throughout the Report to "Jack Schreder." Please note that Jack Schreder was representing the Rainbow Water Company.

5. The Rainbow Water Company intended to rehabilitate the Dam with proceeds from a hydro-electric project. The hydro project was not feasible.

6. I have a 320 acre ranch in Igo and can attest to the need for Rainbow Water It charges our well, provides stock water and provides water for irrigation.

7. It is hoped that the Igo-Ono Community Service District efforts to improve the Dam will be met with more cooperation from the State than was received by the Rainbow Water Company.

8. The Dam is needed and every effort should be made to improve the Dam for community use. It was in the spirit of community support and cooperation that the Rainbow Water Company was sold to local residents.

9. If the Department of Water Resources would have spent the $50,000 that funded this report to design dam improvements, we would all be farther ahead.

Thank you,

Jack Schreder

glw

Response to comments from Mr. Jack Schreder:

1. and 2. The Final Environmental Impact Report reflects the change in ownership of the Rainbow Water Company to the Igo-Ono Community Services District. The ownership change became effective subsequent to printing of the Draft Environmental Impact Report.

3. The Draft Environmental Impact Report sites work contracted by the Rainbow Water Company to the engineering firms of $CH_2M$ Hill, Inc. and Energy Engineering, Inc. As discussed in the report, $CH_2M$ Hill, Inc. conducted limited geotechnical evaluation of the dam embankment. Prior to start of this evaluation, the Rainbow Water Company was notified by telephone and letter that the planned work does not completely satisfy needed evaluations. The water company allowed the engineering firm to proceed with the limited evaluation. The report prepared by $CH_2M$ Hill, Inc. following evaluation confirmed the potential for liquefaction of at least the portion of the dam that was evaluated.

Also discussed in the Draft Environmental Impact Report, Energy Engineering, Inc. was contracted by the Rainbow Water Company to explore the feasibility of hydroelectric generation and costs to upgrade the dam. The Department was notified in March of 1987 that the hydroelectric generation potential was infeasible due to the costs to upgrade the dam. The Rainbow Water Company then proposed to have Energy Engineering, Inc. develop an emergency action plan while plans to resolve safety deficiencies were developed, but only if additional storage were allowed. The Department informed the Rainbow Water Company in April of 1987 that emergency action plans would be acceptable for two to five years, but only at reduced storage levels, while the safety deficiencies were being resolved. The water company informed the Department in June of 1987 that Energy Engineering, Inc. estimated costs to be $625,000 to repair the spillway and faces of the dam. The issues of seismic hazard and condition of the outlet pipes were not addressed. The water company further stated that funds were not available for the repair work.

No record of any work by Raymond Vail and Associates or Kleinfelder Engineering are in the file maintained by the Department on Misselbeck Dam. In response to Mr. Schreder's comments, Mr. Schreder was requested by letter on November 30, 1989 to provide additional information on the extent and results of work by these companies for inclusion in the Final Environmental Impact Report. No additional information was received from Mr. Schreder.

4. References in the Draft Environmental Impact Report to "Jack Schreder" were changed in the Final Environmental Impact Report to "Rainbow Water Company", since Mr. Schreder was acting on behalf of that company.

5, 6, 8, and 9. These comments have been noted by the Department of Water Resources.

7. The Department is cooperating with the Igo-Ono Community Services District to resolve the safety issues associated with Misselbeck Dam. The Department informed residents at the public hearing held November 2, 1989 at Ono that continued partial use of Misselbeck Dam would be allowed while satisfactory progress was made to develop solutions to the various safely problems. Information about potential funding sources, including both low interest loans and grants, was sent to the District. The Department is also cooperating with the District and County of Shasta to identify water supply and water needs in the south-western portion of Shasta County, which includes the Igo-Ono area, and exploration and analyses of the embankment forming Misselbeck Dam.

Motor Supply Company

P.O. BOX 1825
1701 CALIFORNIA STREET
REDDING, CALIFORNIA 96099

ALBERT DOSSEN

November 14, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Mr. Gentry:

The following are my comments regarding your Draft Environment/Impact Report not only from my position as chairman of the Igo-Ono Community Services District, but as well as landowner and water user with a great deal at stake concerning the future of Misselbeck Dam.

I believe the report is far too general in addressing a problem of this magnitude and the full impact on this area and the human element involved has not been properly addressed.

One specific area that is of utmost concern to me is the Preliminary Seismic Hazard Evaluation from the April 15, 1986 $CH_2M$ Hill Geotechnical Evaluation which states at page 5, "The immediate area surrounding the project site has an historically low level of seismicity. . . There is simply not enough known about the seismic geology of this area to be positive."

Also, under the heading of Fault Rupture Hazard at page 5, "An evaluation of this hazard would require detailed geologic mapping of the area surrounding the project; however, to our knowledge this has not been performed." And, in the Conclusion on page 9, "The exploration, testing, and analysis program to get complete DOSOD approval of the embankments would probably cost in excess of $150,000. Even then there is a possiblity that the embankment (as is) would fail the analysis and would have to be substantially reconstructed before approval would be given."

Is this EIR an entitlement program for the engineering firms? How long are we going to study this project? DOSOD has been studying this dam for more than 40 years!

While I was acting as the chief negotiator for the Igo-Ono Community Services District to purchase this facility from

Motor Supply Company

P.O. BOX 1825
1701 CALIFORNIA STREET
REDDING, CALIFORNIA 96099

APERRY VOSSEN

*Schreder & Associates I was assured by the Public Utilities Commission officials, Department of Water Resources personnel, DOSOD personnel, and Shasta County officials that the number one priority was that Misselbeck Dam be owned by a public entity, that we would not be cast into a situation of "big agency versus little agency", and that we as the new owners be given ample time and assistance to work out this mutual problem.*

*I, as chairman as well as a water user have donated countless hours and my own money to accomplish our present status: our primary concern being to get water to the people of this area. We do not dispute the need for repairs on the existing facility and distribution system as there has been absolutely no maintenance performed on this system for over fifteen years. We have gotten this far by donations of time and money from the community. The Community Services District has a revenue of approximately $14,000 to $16,000 annually with expenses almost equal to that amount, not including our annual payment of $5,000 per year for a period of ten years to purchase the system; nor does that figure include insurance of any kind (not even liability) for our directors or workers.*

*Revocation of this permit to store water would remove our only source of income and would be a total breach of mutual trust and confidence displayed during our negotiations.*

*I would hope that due consideration be given to these special circumstances and that together we can find a reasonable and cost effective way to resolve this problem without the necessity of excessive and unnecessary studies which deal in many cases with hypothetical situations, which may never occur. Misselbeck Dam is not only an asset to the Igo-Ono area but to western Shasta County and to northern California.*

*Not since my term on the Board began in 1968 have I witnessed the support and involvement of the community to this level. It would be a major setback to all of us not to be given ample time to find a solution to the current problem and hopefully restore Misselbeck Dam to its full capacity.*

*Thank you for allowing us the opportunity to submit our comments and concerns.*

Jerry Vossen

Response to comments from Mr. Jerry Vossen:

1. The section "Preliminary Seismic Hazard Evaluation" from the $CH_2M$ Hill, Inc. report "Preliminary Geotechnical Evaluation, Rainbow Lake Dam, Shasta County, California" does state "The immediate area surrounding the project site has an historically low level of seismicity." However, the report goes on to state "Large active faults such as the San Andreas (80 miles southwest), Freshwater (60 miles west), and the Gorda Plate Subduction Zone (70 miles west) may potentially have an impact on the project. In addition, currently unrecognized but active faults may be present in the Sacramento Valley or Northern Coast Range. In our opinion, the current state of practice in seismic geology and seismology would support the conclusion that there may be other faults (either unrecognized or with unrecognized activity) with the potential to affect the project through ground shaking." The section concludes with "There is simply not enough known about the seismic geology of this area to be positive." The Draft Environmental Impact Report also identified several other faults ranging from 31 to 107 miles from the dam. Sufficient information is known about the proximity of many fault zones to cause concern for the safety of Misselbeck Dam. Information is insufficient concerning other faults that may also affect the dam.

2. The "Fault Rupture Hazard" section of the $CH_2M$ Hill, Inc. report discusses the lack of known occurrence of faults that actually cross the damsite which could rupture and cause direct damage to the structure. The report states that "there appears to be no actual hazard from direct fault rupture", but that detailed geologic mapping would be necessary for evaluation of this potential. However, the potential still occurs for significant damage to the dam from distant known or unknown faults.

3. The $CH_2M$ Hill, Inc. report stated that their work did not constitute a complete stability evaluation of the dam due to the limited scope of exploration. The report further stated that additional evaluation was warranted to know with greater certainty if there are stability factors that would jeopardize future use of the dam.

Seismic evaluation of Misselbeck Dam may indeed indicate that the embankment is not structurally safe to impound water. Seismic evaluation, however, is necessary to determine the condition of the embankment so that plans can be made to repair the structure or remove the dam from service.

4. Representatives from the Division of Safety of Dams stated at the public hearing at Ono on November 2, 1989 that the Igo-Ono Community Services District would be given sufficient time to make progress toward resolving the safety deficiencies of Misselbeck Dam. The owner of Misselbeck Dam, whether private or public, is responsible for undertaking actions necessary to evaluate the stability of the dam and correcting structural deficiencies.

October 27, 1989

Mendenhall Ranch

State Of California
Department Of Water Resources
Northern District
P.O. Box 607
Red Bluff, Ca. 96080

To Whom It May Concern:

This writing is in referral to the Draft Environmental Impact Report on the Revocation of the Certificate of Approval for Misselbeck Dam and Reservoir as of July 1989. As interested parties of the water district, we would like to interject our points of view toward this recent study.

Because of serious damage by earthquake to the upper and lower Hernando Dams in February, 1971, the department of Water Resources directed all owners of hydraulic fill dams to conduct engineering investigations to determine seismic stability of their dams. Although there is justification for safety, this was, of course, an unpredicted, financial factor to all dam owners, including those of Misselbeck. This put them further back in operating costs. As we are in an era of liability panic and earthquakes are still unpredictable, how can we select just hydraulic fill dams over other material type constructed dams, (Shasta, Whiskeytown Dams, etc.), to be liability unsafe as it has been proven nothing is predictable or infallible in a quake of 6 point magnitude or better? Noting the recent earthquake in San Francisco, any life lost in a disaster is one too many; but a small <u>remote</u> dam as Misselbeck which has been deemed unsafe during a quake, the human life and property that would be lost as stated should be weighed against the multitudes of human life that would be lost in a disasterous quake resulting in the failures of Shasta and Whiskeytown Dams. Weighing the justification of destroying the economy and livelihood of two growing communities, the "What If" factor of a potential earthquake seems misplaced!

In your study, suggestions were made for alternative water storage such as Shoemaker Reservoir on the North fork of Cottonwood Creek, Petty Butte Reservoir on the South Fork of Clear Creek, or Moonfork Diversion to Hoover Dam. These suggestions sound great for potential water storage, but don't you think the financial feasibility for the Igo-Ono communities has been lost in the shuffle of beaucratic paper work? It is sad to note that little water districts such as these who have potential for growth in the future will slowly be destroyed and overlooked for devastating financial water programs such as the development ofa system on the Trinity and at Shasta Dam at the cost of $50 million for cold water discharge into the Sacramento River to enhance salmon spawning! Certainly it has been realized that repairs are necessary to the Misselbeck Dam; but why, as water users are we penalized and unable to get some portional financial support or special funding set aside for Dam safety repairs? If state water agencies set up the earthquake guidelines for dam safety, there should be better co-operation between departments and water districts to help solve the existing problems and less money spent on why the problem exists!

In summary, building large dams today usually would assure a constant water source and supply, but unfortunately it destroys large areas of wildlife habitat and certain areas for fish spawning, also not excluding the misplacement of the human factor. This statement of impact would be one of referral back to the alternative dam sites as stated previously in this letter. New sites, new problems! In essence, to rectify the old problem, is to make better use of the existing system. Misselbeck Dam is such a system. Since establishment years ago, the dam and miles of canal have provided irrigation water for more than 300 acres as stated in the report. The decreased amount of irrigatable acreage is due to flucuation of the water level in the dam because of the safety factor and needed repair, also because of recent years of drought. Wildlife has increased and thrived since the dam was constructed. Agriculture, including the cattle ranches in the area, have becomc dependanton this water supply. In essence, to call the impact on wildlife, agriculture, and the human factor insignificant on revocation of Misselbeck Dam can ramble the minds of those who care!

Yours Truly,

J. A. Mendenhall

J. A. Mendenhall
Ranch Manager

APPENDIX C

Response to comments from Mr. J. A. Mendenhall:

1. All jurisdictional dams in California must meet requirements for structural soundness and safety. Hydraulic fill dams, such as Misselbeck Dam, have proven to be subject to liquefaction during earthquakes. Therefore, seismic stability analysis of hydraulic fill dams, including Misselbeck Dam, was required by the Division of Safety of Dams for their continued operation. Limited analysis of Misselbeck Dam has shown that it may be subject to liquefaction, and subsequently failure, during an earthquake. Dams constructed with other techniques must also be seismically stable. Shasta and Whiskeytown Dams are federal dams and, therefore, not under State jurisdiction. However, federal programs do evaluate these dams for safety.

2. The Division of Safety of Dams is directed by the Water Code to insure that dams are safe. The potential for loss of life is not considered when determining whether a dam is safe. However, the failure of Misselbeck Dam could result in the loss of life for people residing, working, traveling, or recreating in the downstream floodplain.

3. Several possible sites exist that could be developed for water storage should Misselbeck Dam be removed from service. The cost for these alternative water supply sources would be high, resulting in more expensive water than residents in the district are currently using. However, cost sharing for an alternative water supply may be feasible with other water districts seeking additional supplies. Additionally, low interest loan and grant programs are available to assist with financing water supplies for rural communities, which would help reduce the cost for development of alternative water supplies.

4. Several loan and grant programs are available through the State and federal governments to assist communities experiencing water supply problems. Information about these programs has been supplied to the Igo-Ono Community Services District and is included in the Final Environmental Impact Report.

5. Development of new sites for water storage may result in some environmental effects. Any such effects could be avoided by rehabilitating Misselbeck Dam.

6. The Draft Environmental Impact Report stated that about 1,000 acres had been irrigated in years prior to restrictions on storage beginning in 1966. Under restricted storage, available data indicate that only about 381 acres have been irrigated.

7. The Draft Environmental Impact Report stated that loss of water from Misselbeck Dam would cause significant environmental effects that could not be avoided. These include reduced water supply for domestic use, agriculture, fire protection, and wildlife. Subsequently, property values may become lowered and economic development in the area affected.

APPENDIX C

Donald A Kujath
P.O. Box 232
Igo, Ca. 96047

6 November 1989

Wayne Gentry
Dept. of Water Resources
2440 Main St.
P.O. Box 607
Red Bluff, Ca. 96080

Dear Sir:
Subject: Misselbeck Dam and Reservoir

This is to ask your consideration and help in the saving and/or restoration of the Misselbeck Dam and Irrigation system and the saving of the Igo/Ono Community Services District. Using the following considerations:

1. The loss of property values and the economic effects on the raising of stock. The loss of the ability to raise gardens and other greenery that appreciates the value and the enjoyment of the property in the area.

2. The loss of convenient water supplies in case of range or domestic fires. The loss of convenient water supplies would in some areas make it impossible to fight fires for any amount of time and lead to the loss of property.

3. In some cases, the loss of ditch water would make an entire home or ranch unlivable due to the presumption at the time of locating the establishment in the area, it was assumed that the water would be available on a permanent basis. No one was told otherwise.

4. It would no doubt have a drastic effect on the wild life in the area, which would lessen the enjoyment of the residents and would cause some loss of revenue to the local merchants during hunting seasons. Also would have a bearing on local tax revenues, due to the lessening of property values.

Thank you for your consideration
Sincerly Yours
Donald A Kujath
Donald A Kujath
Resident

APPENDIX C

Response to comments from Mr. Donald A. Kujath:

1. The Draft Environmental Impact Report discussed the potential loss to property values and economic effects on the raising of stock. Loss of property value would not affect residents until a property was sold. Property values may not depreciate significantly since the Igo and Ono areas have historically experienced water supply shortages, which have been accepted as part of the inconvenience of rural living. Loss of property value may result in reduced property tax income for local taxing jurisdictions.

Present water supplies generally preclude use of irrigated pasture throughout the summer. Since 1982, only about 381 acres of pasture have been irrigated. Prohibition of storage would probably further reduce irrigated acreage. The amount of water available during years of low natural streamflow would probably limit the amount of irrigated acreage, since acreage developed during years of more abundant water supplies would be lost when water supplies diminished during dry years. The loss of stored water would result in the inability to develop pasture with an estimated value of $13,230 per year.

2. The main effect from loss of storage behind Misselbeck Dam would be the loss of a helicopter reloading area for fire control in the Bully Choop area. The Department of Forestry cannot easily refill fire engines or water tankers from the canal due to the shallowness and remoteness of much of the canal and laterals. Water held in ponds, which may be supplied by the canal, are valuable, however, for refilling of water by fire suppression equipment. Water would probably be available in the canal for filling of ponds throughout the summer during years of normal runoff. During drought years, however, water may not be available in sufficient quantity to maintain water in ponds throughout the service area, resulting in fewer sites for reloading with water of fire suppression equipment. Water tankers and a water tank about 2 miles south of Igo are available for refilling of fire suppression equipment even during drought years.

3. Sufficient water would probably be available from natural streamflow during

normal hydrologic years. During drought years, however, water may not be available to supply water throughout the service area, requiring some residents to make provisions for individual hauling and storing of water.

4. Leakage of water diverted into the canal from natural streamflow would continue to support riparian habitat for a variety of wildlife. Some riparian habitat and associated wildlife may be lost along the lower reaches of the canal if natural streamflow was insufficient to maintain water throughout the canal during drought years. Some populations of game species may be reduced along the lower reaches of the canal, resulting in less hunting opportunities on properties where hunting was allowed. Some loss to local services may occur from hunters attracted to other areas with better huntable populations of game species.

**APPENDIX C**

November 11, 1989

Mary and Donald Belkin
P. O. Box 270
Igo, California 96047

Department of Water Resources
2440 Main Street
P. O. Box 607
Red Bluff, CA 96080

Attn: Wayne Gentry

Re: *Draft EIR*
Misselbeck Dam/Reservoir

Gentlemen:

In response to the above referenced EIR, we write to raise the following comments and/or concerns:

1. *FIRE PROTECTION*

On the subject of fire safety, we note the EIR, wherein it states:

> Water available for suppression of wildfires and structure fires in the Igo-Ono area would be reduced by the prohibition of storage behind Misselbeck Dam. (Pg. 62)

It is our understanding that our local CDF provided the background information on the enhancement of fire-fighting capabilities from the water contained in the ditch and the ponds. Did the CDF further provide you with information on the fire hazard severity classification of this area, which would be negatively impacted by the prohibition of storage of water? For example, it is our understanding that much of our subject area is classified as "high," "very high," and "extreme," in fire severity classifications.

Additionally, are you aware of the incidence of fires in this community which we typically experience on a yearly basis. Likewise, are you knowledgeable on the historic use of our ponds and the ditch in providing water to fight these fires?

On the subject of fire, we particularly emphasize another factor, ingress and egress. Those of us who live on Zogg Mine Road are especially mindful of fire-fighting capabilities: we live on a dead end road, with only one way in and one way out. In the event of a wildfire, residents living on the upper half of this road are potentially threatened with being trapped. We can only assume, therefore, that any reduction in fire-fighting capabilities on the lower portion of the road would increase the risk to loss of life if a wildfire were to burn up the canyon. Our property contains three ponds, all of whom are fed by the ditch and all of which could be utilized in the event of a fire. Other properties on the lower part of Zogg Mine Road also contain ponds fed by the ditch and/or its run-off.

Please note that other areas of the community may be affected in a similar manner, given these factors of severity of fire classifications, availability of water and limited ingress and egress. We, therefore, request that you solicit additional information in preparing the final EIR.

2. WILDLIFE

For the sake of accuracy, please note the following ommisions on the list of wildlife species in the vicinity of the Happy Valley Irrigation Canal:

We personally have a resident beaver (Castor canadensis) in our pond. Additionally, we have observed on several occasions, three White-tailed Kites (Elanus leucurus), over our pasture. Though neither of the aforementioned species are endangered or threatened, we wish to point out their existence.

On the subject of wildlife population in this area, we wish to express our concern for their displacement and eventual inability to find suitable alternative habitat. Further, we do not agree with the statement that "losses of fish and wildlife dependent on the reservoir would probably not be significant," though we make no claim to being wildlife biologists.

3. ECONOMY

Please note that although many of us have come to grips with water shortages in the past, (like most Californians),we believe our domestic supply of water via wells and springs is supplemented by the ditch.Please note that our spring which supplies our domestic water supply in its entirety is located 50 yards downhill from the ditch. Over the years, we have utilized the services of a water professional and he has indicated his belief that our spring is fed from the ditch.

Though the preliminary EIR reflects this relationship between the canal and supplementary effect on wells and springs, it is vague, at best. We therefore, take the position, that before any conclusions can be adquately made about the effects on property values from prohibition of water storage, that a more detailed study must be made on the extent to which the canal augments existing domestic water supplies. Suffice to say, those of us with current dependable domestic water supplies,supplemented by the ditch, would encounter great economic hardship from the loss of same. Likewise, people with domestic water shortages, supplemented by the ditch, might well encounter greater shortages, if the canal medium were not fed by the release of Rainbow Lake water. In any event, we believe that the question of impact on property values can only be adequately addressed in the content of developing very specific information on the ditch's role in feeding domestic water supplies.

Additionally,we initially purchased our property because of a number of improvements, all of which depend upon water from the ditch. For example, we maintain a sizeable mature orchard (20 - 30 years old), three ponds and irrigated pasture for our stock. Aesthetics aside, the value of our property would be greatly diminished if we were not able to maintain these improvements. We believe, therefore, a more quantifiable analysis should be made on the economic impact on all properties affected by the ditch.

In closing, we wish to point out that the aforementioned comments are not intended to take issue with your department's position that the situation of the dam must be corrected. Rather, we ask that you embellish upon the environmental impacts in the areas of fire, listing of wildlife species and property values.

It is also our hope that you will find the actions of our community reasonable, inasmuch as we have only assumed control and responsibility for the dam this past August. We believe we have acted in good faith and we wish to correct the deficiencies of the dam. We look forward to receiving a list of potential funding sources so that we may proceed with funding applications for studies and repairs. Meanwhile, please continue to work with us and allow us further time to get the job done.

Thank you for your consideration of the above.

Very truly yours,

Mary A. Belkin

Donald E. Belkin

Response to comments from Ms. Mary A. Belkin and Mr. Donald B. Belkin:

1. The Public Resources Code provides fire ratings based on fuels, weather, and topography. The Igo-Ono area south of Platina Road is rated as high fire danger due to hot dry summers, and largely grass covered rolling hills. The area north of Platina Road is rated as very high fire danger due to the steeper topography, and denser growths of brush and trees. The presence or absence of Misselbeck Dam does not affect the fire rating of the area.

The fire history of the Igo-Ono area is one of minimal fire occurrence. Use of water from the canal for fire protection, therefore, has been minimal. In addition, the Department of Forestry cannot easily refill fire engines or tankers from the canal due to the shallowness and remoteness of much of the canal and laterals. Ponds maintained by the canal may be used for a water supply to fight local fires, but water tankers would usually be available to provide additional water to fire engines. Additional water is available from a water tank located at the intersection of Platina and Cloverdale Roads near Igo.

The hazard from fire occurrence in rural areas is generally higher along dead end roads. Fire suppression equipment could be refilled with water for fighting fires in the Zogg Mine Road area from ponds maintained by the canal, or from the South Fork of Clear Creek which parallels much of the road. Additional water is available from the tank located about 2 miles south of Igo and Zogg Mine Road.

2. Both the beaver (Castor canadensis) and white-tailed kite (Elanus leucurus) were added to the species list in the Final Environmental Impact Report.

Storage behind Misselbeck Dam has become depleted on numerous occasions, and most recently in 1986 and 1987. The loss of reservoir habitat during these years would have eliminated any fish or wildlife species that strictly dependent on that type of habitat.

3. The Igo-Ono area lies outside the Redding Ground Water Basin. Quantities of

water produced from wells vary locally depending upon the underground fracture system. Data from well drillers reports indicate that the median well yield is less than one gallon per minute, with some wells yielding up to 37 gallons per minute. The Draft Environmental Impact Report also noted reports from local residents that many drilled wells yielded no water, and, in general, ground water availability is negligible. The report also noted that data are insufficient to determine the extent of well recharge from canal leakage, but residents report that wells go dry when the canal is dry. Losses of water to leakage from the canal, which may be extensive, undoubtedly contributes to recharge to wells located in the vicinity of the canal.

Water supplies distributed by the Igo-Ono Community Services District could be enhanced by reducing losses due to canal leakage. Yield from many private wells could become reduced, thereby requiring residents to rely directly on service from the district. The Igo-Ono Community Services District would then receive compensation from water users who previously received water through canal leakage, but were not compensating the district for the water.

The Igo-Ono area has historically experienced water supply shortages, which have become accepted as part of the inconvenience of living in the area. Property values, therefore, may not depreciate significantly due to the loss of storage from Misselbeck Dam. In recent years, storage has become depleted. Improvements dependent upon greater water availability would have been eliminated during these years. Losses to water dependent activities, such as orchard irrigation, may not be significant, therefore, from elimination of storage supplies. Water would still be available from natural streamflows. Future growth in the area and water intensive uses, such as orchard irrigation, would be restricted by the amount of water available during drought years. Mitigation by rehabilitating Misselbeck Dam or constructing a new storage facility would eliminate the effects of loss of storage.

October 26, 1989

TO: U.S. Senator Alan Cranston
1390 Market St., Ste. 918
San Francisco, CA 24102

U.S. Senator Pete Wilson
250 Sutter St., Ste. 400
San Francisco, CA 94108

APPENDIX C

State Senator John Doolittle
720 Sunrise Ave., Ste. 110D
Roseville, CA 95661

State Senator Jim Nelson
2400 Washington Ave., Ste. 120
Redding, CA 92001

State Assemblyman Stan Statham
State Capitol
P.O. Box 942849
Sacramento, CA 94249-0001

County Supervisor Bob Bosworth
1500 Court St., Room 207
Redding, CA 96001

Dear Representative:

I invite you to attend an important meeting of our communities on November 2, 1989, at the Ono Grange Hall, Ono, California, 7:30 PM., to discuss the Draft EIR which recommends revocation of use of the Misselbeck Dam and Reservoir.

I share with my community many concerns, among them:

1. The Misselbeck Dam supports Rainbow Lake, a reservoir which serves our communities via a 17-mile canal. The canal provides domestic water for Ono and, indirectly, Igo as well. It irrigates farmland, supports many species of wildlife, recharges surface wells, and provides fire protection for a large area.

2. The dam serves as a sediment basin, hence less sediment build-up in the Sacramento River.

3. I realize the dam may be unsafe by modern standards. However, I request the opportunity for my community to review the data that has determined such unsafety, and to consider the relative merits of the choices we have been faced with: (1) lose the dam; (2) repair the facility to acceptable standards; (3) remove the dam and build a new one; (4) declare the area below the dam a flood zone, thereby limiting growth.

4. A point that must be addressed is the relative risks of possible future dam failure as compared to the certain great losses that would be suffered immediately if use of the dam were revoked.

5. I point out that although the stated number of customers of the Igo-Ono Community Services District, which owns the dam, is 42-48, this is not a complete picture. Ono, for example, is listed as one customer. The actual number of users to date is closer to 70. The possible number of users for the future is much greater.

6. If use of the dam is revoked, not only will we suffer the losses noted above, we will suffer great loss of future growth. What will the value of our land be, when we have minimal or no water to offer? Who will move into the area to develop agriculture and industry, and hence revenue for Shasta County?

We need time to study the alternatives, investigate funding available from state and federal agencies, determine future risks vs. immediate certain loss factors, and develop a plan to SAVE OUR DAM!

And we need your help. Please look into this situation with us. Attend the meeting if possible. What suggestions can you offer? Thank you for your support.

Sincerely,

Paul Humphrey
Signature

Address: HCR-1 Box 7010
Igo, Ca. 96047
Rainbow Lake Rd 460
Ono, Ca.

Phone:

APPENDIX C

Response to comments from Ms. Paula Humphrey:

The Draft Environmental Impact Report makes no recommendations for the revocation of the Certificate of Approval for Misselbeck Dam. The report is an informational document required by the California Environmental Quality Act. The purpose of the report is to inform the Division of Safety of Dams of the possible environmental effects that may occur if the Certificate of Approval were revoked.

Declaration as a flood zone of the area below Misselbeck Dam is not an alternative to correcting any structural deficiencies so as to safely store water.

The Water Code directs the Department of Water Resources to require owners of dams to perform engineering, geologic, and other work, as necessary, to disclose information sufficient to enable the Department to determine the structural integrity of the dam and to perform other work necessary to safeguard life and property. Geotechnical evaluation by a private consulting firm has determined that Misselbeck Dam is subject to damage from liquefaction during possible earthquakes. The Department, therefore, has ordered previous and present owners of Misselbeck Dam to perform additional evaluation and to develop a plan of action to resolve the safety issues or remove the dam from service. The Environmental Impact Report discloses the effects of revocation of the Certificate of Approval.

The Draft Environmental Impact Report stated that water is provided directly to between 42 and 48 customers, while another 16 are served from water redistributed at Ono and 6 are served from water redistributed at Igo. The total number of customers, therefore, is between 64 and 70. Additional growth in the Igo-Ono areas would probably increase the number of customers requesting water from the Igo-Ono Community Services District.

Economic activity in the Igo-Ono areas would probably not increase without a dependable water supply. Property values may not decrease significantly since the area has historically experienced water supply problems, which have become accepted as part of the rural inconvenience of living in the area. Future economic

development could be fostered through mitigation by rehabilitating Misselbeck Dam or developing alternative water supplies.

November 15, 1989

**APPENDIX C**

P.O. Box 96
Igo, Calif.
96047
ph: (916)396-2949

RE: State of California
Department of Water Resources
Northern District
Draft Environmental Impact Report on the Revocation of the Certificate of Approval for Misselbeck (Musselback) Dam and Reservoir, July 1989

Mr. Wayne Gentry, Chief, Northern District, DWR
P.O. Box 607
Red Bluff, Ca. 96080

Dear Mr. Gentry:

In the spring of this year, I made a special trip to Red Bluff to find out more about the recently passed California Proposition 82, which makes bonds available at low interest rates to local governments contemplating necessary water development projects. In view of your department's recent recommendations regarding destruction of Misselbeck Dam, I'm sure that you would agree that the proposition would be of great interest to members of the Igo-Ono Community Services District. After speaking with Mr. Claussen and Mr. Stewart, I was informed that I would be sent all the information that your department had to offer. To date, I received nothing. I assume that means that you have no information to send. If so, may I have the address of the pertinent agencies who DO have information sent to me? I have already been instructed by board members of our community services district to continue looking into the proposition, and report my findings to them at the next scheduled meeting. Therefore, I would appreciate your soonest possible response to this inquiry.

Further, I would like to add my name to the list of concerned citizens of this western Shasta County community services district who request that you do not attempt to remedy a POSSIBLE threat to our community's health, safety and welfare, by revoking the Certificate of Approval for Misselbeck Dam without an alternative water plan in place. Such an act would directly cause a CERTAIN threat to our community's health, safety, and welfare. The water stored behind the dam feeds the arteries of life to our homes and farms, either directly from the Happy Vally Ditch, or indirectly, by recharging our water table. Without the water, animal life will literally be forced out or perish. That includes us humans, unless we're prepared to endure severe hardship. With all due respect for Mr. Boles' credentials, his report of the impact of depriving a community of it's water source is sadly under-exaggerated. A loss of water storage equivalent to that held behind Misselbeck Dam would force a mass migration of occupants from the affected area in the event of a drought of the same magnitude as the one we suffered a mere decade ago. As I write this, we are experiencing one of the driest Novembers on record. Our summers invariably feature many days with 110° + temperatures, which occasionally reach 120°! It is not difficult to perceive the quality of life existing in such a scorched environment with a dry well, resulting not from possible natural disaster, but from a certain government agency caused one. I.e.: Kill the patient and cure the disease. May I suggest an alternative water plan on the next page?

## APPENDIX C

Please note the enclosure which is from a USGS Topographical map, the Ono, California Quadrangle. There are excellent reservoir sites, two of which are shaded, in this area. I believe these sites are preferable to others suggested including those mentioned in your referenced impact report. The water storage area, with a crest at an elevation between three hundred fifty and four hundred meters, would occupy an area presently used only for grazing. It contains no home sites, prime bottom land, nor timber. A great deal of it is already owned by the Federal Government. Acquisition through condemnation would be utilized much less than in other sites, making this site the least expensive. The water pool area would not only cover more acreage, but it would also be deeper than other suggested sites. It is also located conveniently close to the present Igo-Ono Community Services Ditch. Though the ditch is slightly higher in elevation, this dam site lends itself to a hydro-electric installation which could pump the water rights portion allotted to our district to the ditch, and still supply water to a downstream purchaser.

Frosting for the cake would be a better regulated water flow in Cottonwood Creek, which could return it to its turn of the century status of a blue ribbon salmon and steelhead spawning ground. It's a strong argument, since the other sites mentioned would either have no effect, or adversely affect the salmon, having either an insufficient storage capacity, or covering the spawning beds, themselves, as with the proposed Federal Cottonwood Creek Project.

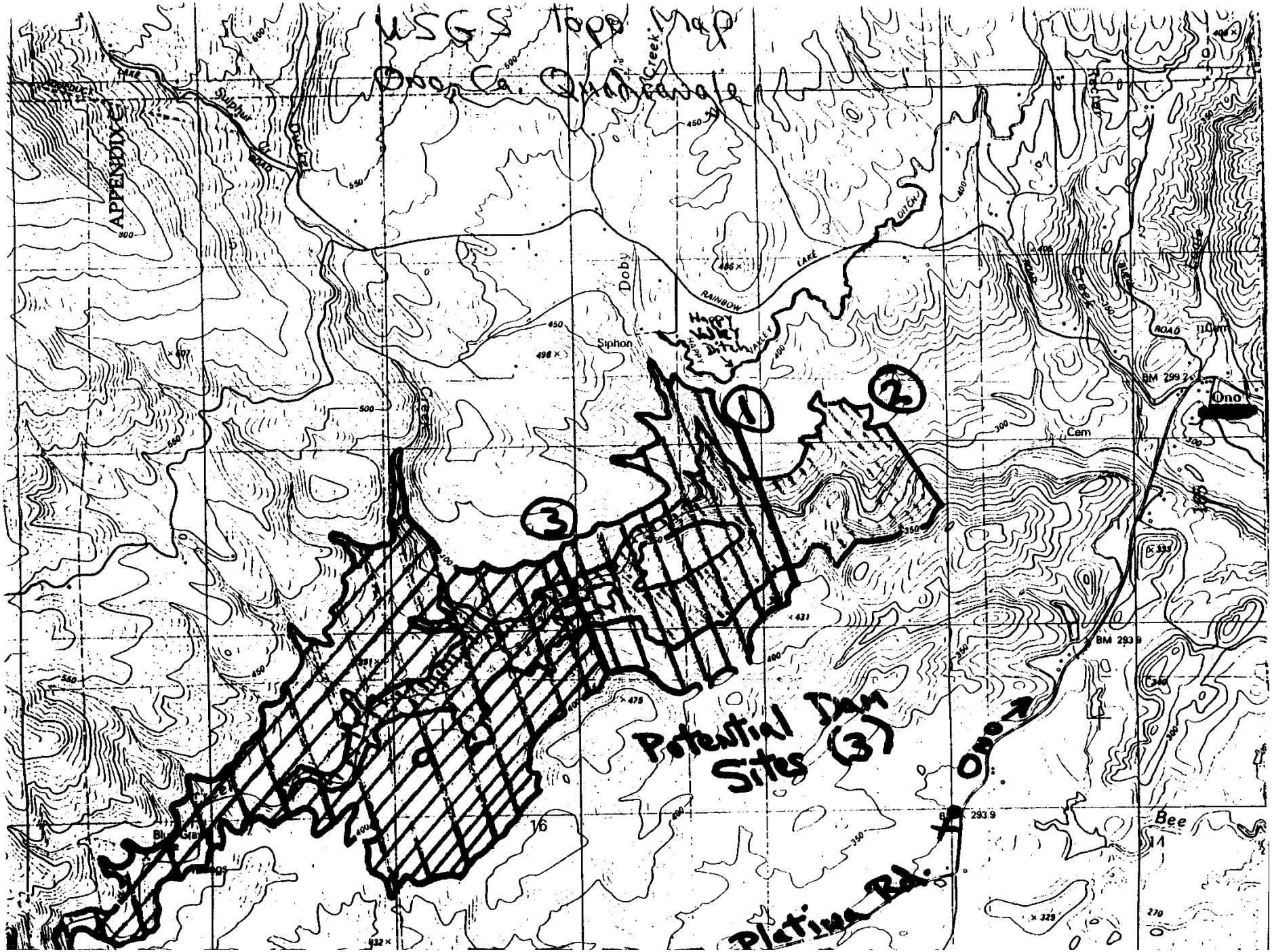
How to pay for this proposed site? I entreat you legislators receiving a copy of this missive. Please consider it as a humble invitation to exercise your considerable administrative expertise toward resolving our dilemma. Possibly you are aware of water consumers who could help finance construction of such a new dam, in exchange for the surplus water generated. Further, would not the City of Redding be interested in the project as a possible source of hydro-electric power? Their present power plans seem to have been stymied to save the salmon.

The crisis which we few hundred in western Shasta County face could be resolved to the benefit of the entire state of California. We have the raw resources. We seek partners with the vision to see the real profit of their investment. I am at your service to help alleviate the impending threat to our community welfare in any way that I can. Please feel free to contact me at the above address or phone number at any time.

Thanks in advance for keeping me informed.

Sincerely,

Michael Spencer


USGS Topo Map
Ono Ca. Quadrangle
APPENDIX
Doby
Siphon
Happy Jack Ditch
RAINBOW LAKE
Cem
Ono
BM 2939
Potential Dam Sites (3)
Platina Rd. to Ono
Bee
1
2
3

Response to comments from Mr. Michael Spencer:

The Water Conservation Bond Law was enacted following voter approval of Proposition 82 in 1988. Passage of Proposition 82 made available $60,000,000 in loans for water conservation, ground water recharge, and new local water supply projects. Information about this proposition has been sent to Mr. Spencer.

The Water Code directs the Department of Water Resources to require owners of dams to make any necessary evaluations and repairs to maintain dams in a safe condition, or remove them from service. The Igo-Ono Community Services District has the option of evaluating and repairing Misselbeck Dam or removing the dam from service. The Draft Environmental Impact Report discussed the effects of removing the dam from service. The report stated that sufficient water should be available from natural streamflows during normal hydrologic years. However, during drought years sufficient water may not be available to supply water throughout the service area. Residents in affected areas would then have to make provisions for hauling and storing water.

Construction of a dam at any of the proposed sites would be an expensive undertaking. An Environmental Impact Report would have to be prepared. Significant environmental effects, such as loss of rare or endangered plants or spawning habitat, would require mitigation. The dam and reservoir sites and water rights would have to be acquired. Materials for construction of the dam embankment would have to be located. Geologic exploration of foundation materials would be necessary to determine the suitability of the sites for a dam. In contrast, rehabilitation of Misselbeck Dam would require no new Environmental Impact Report, minimal mitigation of environmental effects from construction, no acquisition costs for the reservoir site or water rights, and less extensive geologic exploration. In addition, Misselbeck Dam could not simply be abandoned for an alternative water supply. Removal or extensive modification of the dam, at considerable cost, would be required to preclude storage of water.

The proposed dam sites are not particularly attractive topographically (Linton

Brown, DWR, pers. comm.). Dam heights of over 300 feet are shown on the topographic map, which would create reservoirs with storage that appear to be in the 20,000 to 40,000 acre-foot range. This creates extremely expensive storage. A proposed 220 foot high Hulen Dam just downstream of Mr. Spencer's proposed dams would store about 130,000 acre-feet at a cost of about $80,000,000. The details of the pipeline and penstock to Clear Creek are not shown, but the distance would be about 8 to 10 miles. Again, this is not an inexpensive undertaking. Whatever power and water that might be developed by the dams proposed by Mr. Spencer would be much more expensive than anyone is likely to accept.

# APPENDIX D

## LETTERS OF CONCERN FROM CITIZENS

Numerous letters were received from individuals concerned about the potential loss of water supply from Misselbeck Reservoir. Comments from these individuals reiterated potential impacts identified in the Draft Environmental Impact Report. The letters expressed concern that loss of the reservoir would reduce the water supply for: livestock maintenance and irrigation of farms, gardens, and landscapes; recharge of wells and springs; and wildlife habitat associated with canal leakage. Subsequent environmental effects discussed included: stifling of growth and the local economy; loss of wildlife; increased fire hazard; decreased fire suppression capability; and increased sedimentation downstream of the current dam. The respondents were also interested in the availability of grants or loans to assist in rehabilitating the water system.

No additional discussion of these comments is included since these issues had been addressed in the Draft Environmental Impact Report, and the respondents are supporting that information. The letters are included for consideration by the Division of Safety of Dams during the process of determining whether the Certificate of Approval for Misselbeck Dam should be revoked.

**Michael J. Dinius, D.D.S.**
842 Hartnell Ave. • Redding, CA 96002 • (916) 222-0221

APPENDIX D

November 14, 1989

Department of Water Resources
2440 Main Street
P.O. Box 607
Red Bluff, CA 96080

Dear Mr. Gentry;

I am writing in regards to the closure of Rainbow Lake and the dismanteling of Missleback Dam.

As a long time resident of Shasta County I am concerned that the quality of life that we enjoy in this area is once again threatened. Due to the seepage from the ditch a lush habitat for wildlife currently exhists. CDF's ability to protect this area from wildfires is also dependent on the water from Rainbow Lake.

I'm told that you are currently working with the Community Services District on trying to preserve the permit to keep the dam. I speak for many of my neighbors as well as myself in asking for your continued support and assistance in avoiding this possible environmental misfortune.

Thank you.

Sincerely,

M J Dinius DDS

Michael J. Dinius, D.D.S.

cc: Senator Nielsen
Supervisor Bosworth
Assemblyman Statham
Congressman Herger

APPENDIX D

Mr. and Mrs. Aaron Forschler
P. O. Box 8
Igo, California 96047
November 10, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Sir:

My wife and I have lived in the Igo-Ono area for our entire lives. We live on a ranch which has been in my family since the 1860's, and my wife was raised on the Barr Ranch in Ono. Both ranches have continuously used water from Rainbow Lake for irrigation from the beginning of service. We are very dependent upon the water from Rainbow Lake in order to provide water for our livestock and irrigation. During one period when there was no water in the ditch, I had to haul water for my animals. We have several wells and feel that the water from the irrigation ditch has a great influence upon the amount of water in them.

We realize there is no easy solution to the problems we face regarding the dam. We would appreciate anything that you can do to help provide funds to restore or replace the dam.

Sincerely yours,

Aaron Forschler
Vivian Forschler

Jeffery L. Forschler
P. O. Box 4
Igo, CA 96047
November 11, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Sir:

I was born in Redding, and have lived in Igo all my life. Water from Rainbow Lake allows us to have a pond on our family ranch, which is used to water my livestock, and can be used for irrigation as needed. I would have to haul water for my animals if irrigation water were not available. I also use well water and feel the irrigation water from the ditch has an influence on the water table in the Igo area.

I would appreciate your help in finding funds to help us save or replace the dam. Thank you.

Sincerely,
Jeffery L. Forschler

SUNNY HILL RANCH
ONO, CALIFORNIA
c/o 41 COMISTAS COURT
WALNUT CREEK, CA 94598



November 28, 1989

Mr. Wayne Gentry
Department of Water Resources
2440 Main Street
P.O. Box 607
Red Bluff, CA 96080

Dear Mr. Gentry:

As owners of nearly 800 acres in the Ono area and a customer of the Igo-Ono Community Services District, we are very much concerned about the future of the dam at Rainbow Lake and the continued availability of water.

We need financial help to keep the water flowing. A cut-off of water would ruin the local economy and trigger a sharp drop in land values. We're equally concerned that it would severely limit the water now available in wells and springs and thus make most of the area uninhabitable.

Spending money to remove the dam and prevent downstream silt could just as well be spent to improve this dam.

While we support your bringing this issue to a decision point, we now need your help and the help of all the public officials to promptly get on with repairing the dam.

Sincerely,

Patricia A. Grubb
Edgar H. Grubb

cc: Supervisor Bob Bosworth
Congressman Wally Herger
Senator James Nielsen
Assemblyman Stan Statham

13 November 1989

Dear Mr Bales:

Re: Certificate of Approval for Mitsubishi Dam & Reservoir

As residents for many years in the Ojai area, we request your assistance with our water problem.

In addition to lowered land values, loss of the water would devastate our wildlife and vegetation and fire protection would be seriously affected.

We trust that with the Department of Water Resources and the residents of Ojai working together that a solution will be worked out that will serve our very special community.

We appreciate your help.

Sincerely,

Glenn & Laura Haggard
PO Box 37
Ojai, Ca 93023

P.O. Box 33
Dyer CA 96047
November 7, 1989

Mr. Wayne Gentry:

We find it incredible to think the government would take away our water. We are entirely dependent on it for our irrigation & household survival. We would have to join the homeless population without it. And so would everyone we know out here. Would it be economically wise to have a whole lot of productive farmers, ranchers & orchardists on welfare — caused by their very own government?

Sincerely,

Jill Halloran

Nov. 5 /

P O Box 81
Igo ca 96047

Dear Sir:

Since I, like many others in this area, and others not living here, am concerned about the fate of Trinity Dam I would like to make a few comments about the draft Environmental Impact Report on the dam.

The removal of the dam would surely affect everyone living in this area. Lack of irrigation would affect all the farmers & ranchers dependent on the water for their pastures, ponds and most likely the wells. Then too, many depend on the water from the irrigation system for household & for trees & lawns. Since the lack of water would dry up many ponds & lakes, the danger from fires, structural & wild would increase.

Another concern of mine is the welfare of our wildlife, deer, bear, game birds & others that would most likely be affected and cause their demise or the migration to more friendly habitat.

I know you too are concerned & I urge you to use your good offices to extend any help you can to my community on this matter.

Thank you

Dennis Hurst
P O Box 81
Ojai ca 96047

Dept. of Water Resources
2440 Main St.
Post Office Box 607
Red Bluff, CA 96080

**APPENDIX D**

Nov. 18, 1989

Dear Sir;

I am writing in regards to the closure of Rainbow Lake and the dismantling of Missleback Dam.

The Igo/Ono area is one of the last strong holds for wildlife in Shasta County. Wildlife whose habitat is depending upon water from Rainbow Lake would no doubt disappear from the area forever should the ditch go dry.

I'm sure you are also aware of the economic hardship this area would suffer as well as making it very difficult to fight wildfire.

I would appreciate any help that you can give the community in saving Missleback Dam.

Sincerely,
Dustin Madden

Dustin Madden
1787 Marlene Ave.
Redding CA 96002

cc; Bob Bosworth/Shasta County Board of Supervisors
cc; Wally Herger/Congressman
cc; James Nielsen/Senator
cc; Stan Statham/Assemblyman

APPENDIX D

Charles Mosher
P. O. Box 8
Igo, Ca. 96047
November 9, 1989

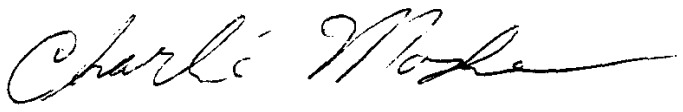
Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Sir:

Please help us find a solution so we can keep up the water system in the Ono and Igo area. Thank you for any help you can give us.

Regards,

Charles Mosher



APPENDIX D

Randy Mosher
P. O. Box 215
Igo, CA 96047
November 12, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Sir:

Please help us find a way to save the water system for Ono and Igo. Your help will be greatly appreciated. Thank you.

Respectfully,

Randy Mosher

**APPENDIX D**

November 6, 1989

P.O. Box 222

Igo, CA 96047

WAYNE GENTRY
DEPARTMENT OF WATER RESOURCES
2440 MAIN STREET
P.O. BOX 607
RED BLUFF, CA 96080

Dear Mr. Gentry:

With regard to the draft Environmental Impact Report on the Misselback Dam in Ono, California and the issue of whether or not the dam is safe, please consider the following request.

We have had several meetings (Igo-Ono Community Services District) both locally and with representatives from the State Water Board regarding this subject.

The members of this community realize that the dam needs some repair work and we are diligently striving to attain a level of agreement between ourselves and the State Water Board insofar as complying with the Impact Report.

What we need is time -- time to devise a plan which would be satisfatory both to the Community Services District and the Bureau of Safety of Dams so that we can both come to terms of agreement. Needless to say, finances come far short of what we presently need to do what must be done; consequently, we need help in determining levels of funding and what type of funding is available to us.

Again, as I have stated, we are trying to "buy" time now. If we no longer have access to water from the Misselback Dam, the consequences would be irreversible. We, here in this community, love our wildlife, clear streams, and quiet, peaceful way of life. Should the dam be condemned for future use, we would be deprived of this. Also, many of our community members depend upon this water for their livlihood--it is not just a matter of convenience for some.

Our land here would be endangered by fires with some residents having no source of water to put fires out other than that provided by seepage and ponds from the dam.

Please do not take away this piece of "God's country". The environmental effects should the community be deprived of this life-giving water would be horrendous.

Thank you for your consideration.

Sincerely,

Lars Pearson

Stephanie Pearson

Lars Pearson
Stephanie Pearson

cc: Bob Bosworth
Shasta Co. Board of Supervisors

Wally Herger, Congressman

James Nielsen, Senator

Stat Statham, Assemblyman

Nov 13, 1989

Wayne Gentry & Gerald Boles
Dept of Water Resources
2440 Main St P.O. Box 607
Red Bluff Calif 96080

Gentlemen:

I am writing concerning your Environmental impact report on Misselbeck Dam and Reservoir. I would like to urge your people to work with the Igo - Ono Community Services Dist in any way possible to help us secure some sort of financial help to do the necessary repairs that are outlined in the report.

Myself and my family have relied on this system for many years to irrigate our ranch, charge our domestic wells, and for livestock drinking water.

Again, I urge you to help us in any way you can. It would be a disaster for the Igo-Ono Area to lose this System.

Sincerely: Dennis W. Powers
Shirley M. Powers
HCR1, Box 3855, Igo, Calif 96047

Oct. 13, 1989

Department of Water Resources-
P.O. Box 607
Red Bluff, Ca. 96080 —
Mr. Boles -
Dear Sir:

We received and read the report on the revocation of the Misselbeck Dam and Reservoir.

We are the third generation to use water from Rainbow lake and would hate to see the water system destroyed.

Most of my neighbors largely depend on the water for part of there livlihood. Loss of the water for wild life would be incredibly devastating. This we know because of the drought years.

It seems that destroying the dam is the only option.

Aren't there grants or some other options we could use?

Granted the canal is not in the best shape but it is being worked on and improved. Also we take exception to the statement that fifty percent of the water is lost to seepage - That is not true. Also the amount of water used for irrigation is also very much under-estimated

Please help us save our homes and ranches by telling us what to do to save the dam instead of destroying it.

Sincerely - 13 Ranch -
Mr + Mrs Gene Ferris - Jge Ca. 96047

Dyer Calif
Oct. 30, 1959.
625.1
IT. 5

Department of Water Resources
Red Bluff.

Dear Mr Gentry,

We recevid and read the report on the revocation of the Misselbeck Dam, and Reservoir

We are the third generation to use water from the Rainbow Lake, and would hate to see the water system destroyed.

Most of our neighbors largely depend on the water for part of their livelihood. Loss of water for irrigation, livestock, wildlife and fire protection would be incredibly devastating. How well we learned this lesson because of the drought years.

Please help us save our homes and ranches by telling us what to do to save the

If am insteab of destroying it.

Sincerely,

Mr + Mrs Hare Power
13 Ranch
Lgo, Calif -

10-12-89

CALIFORNIA WATER RESOURCES DEPT.
2440 MAIN
RED BLUFF, CA 96080
C/O JERRY BOLES

DEAR SIR.

I AM WRITING THIS LETTER AS A CONCERNED CITIZEN IN THE IGO AREA. I HAVE BEEN A RESIDENT OF THIS AREA MY WHOLE LIFE AS WELL AS MY PARENTS AND OTHER FAMILY MEMBERS. OUR MAJOR LIVELIHOOD FOR MY FAMILY AND OTHERS HAS BEEN AND STILL IS LIVESTOCK. WE HAVE BEEN CUSTOMERS OF THE RAINBOW WATER COMPANY FOR YEARS. WITHOUT THE STORAGE OF WATER IN THE MESSELBECK DAM THIS AREA AS A WHOLE WILL NOT BE ABLE TO CARRY ON.

IN MY OPINION, THE DIVERSION OF THE EXTIRPATION OF THE MESSELBECK DAM, OUT WEIGHS, THE EXTIRPATION OF IT IN A NATURAL DISASTER. WATER TO ANY AREA IS AS IMPORTANT AS GASOLINE IS TO A VEHICLE. WITHOUT IT NEITHER FUNCTIONS.

THE AREA AS A WHOLE WILL BE ANOTHER "GRAPES OF WRATH". WATER IS SCARCE NOW, BUT COMPLETELY WITHOUT

IT IS BEYOND THE CONCEPTION OF ANYONE. I WANT TO SEE THE DAM KEPT UNTIL FUNDS CAN BE SOUGHT FOR REPAIRS TO MEET THE SAFETY MEASURES OF THE STATE. HOPEFULLY THRU A GRANT.

THANK YOU,

Mary Jan Powers

MARY JAN POWERS
P.O. BOX 42
IGO, CA 96047

WAYNE GENTRY
DEPT. OF WATER RESOURCES
2440 MAIN STREET.
P.O. BOX 607
RED BLUFF, CA 96080

NOVEMBER 2, 1989

APPENDIX D

DEAR SIR:

I AM WRITING TO YOU IN REGARDS TO THE MESSELBACK DAM ISSUE IN THE IGO-ONO AREA.

I AM ASKING FOR YOUR SUPPORT TO HELP BACK OUR COMMUNITY ON SAVING OUR ONLY WATER SOURCE. I AM A LIFETIME RESIDENT OF THE IGO AREA. MY PARENTS HAVE BEEN RANCHERS IN THIS COMMUNITY FOR ALMOST THEIR ENTIRE LIFE-TIME. WATER FROM THE MESSEL BACK DAM IS VITAL TO US AS WELL AS TO OTHERS. WITHOUT IT WE WILL NOT BEABLE TO CONTINUE RAISING LIVESTOCK.

I UNDERSTAND THE ISSUE ON THE SAFETY OF THE DAM. I'M JUST HOPING A REASONABLE DECISION CAN BE REACHED EITHER THRU A GRANT OR WHATEVER IT TAKES FOR THE COMMUNITY TO SURVIVE. THE ORDEAL OF REMOVING THE DAM WOULD BE DEVASTING TO THE ENTIRE COMMUNITY, INCLUDING WILDLIFE, AND CERTAIN SPECIES OF VEGETATION.

THANK YOU.

SINCERELY,

Mary Jan Powers

MARY JAN POWERS
P.O. BOX 14
IGO, CA 96047

November 13, 1989

Wayne Gentry,and Gerald Boles
Department of Water Resources
2440 Main Street
P. O. Box 607
Red Bluff, Calif. 96080

Gentlemen:

At the recent meeting held at the Ono Grange Hall, on November 2, 1989, your department requested the citizens of our community to respond to the consequences of the discontinuation of impounding water behind Misselbeck Dam in its present state by November 15, 1989.

The consequences to us and our community would be catastrophic. Our ranch depends wholly on the existance of water supplied by Misselbeck Dam. Without it we would have no water to irrigate our pasturesfor cattle, to keep our well generated, and for fire protection. During the hot summer months our property would dry up around our house and outbuildings.

The habitat the 17 mile ditch provides for wildlife would virtually disappear. Some if the wildlife we have are; quail,egrets,blue heron,gray fox, bobcats,mountain lions,black bear,gray squirrels, rabbits,wood ducks along with other duck speciès, and many other species of wildlife.

We appreciate you giving us time to apply for grants or loans to bring the dam and spillway up to State Code.

Sincerely,

Robert M. Richter
P.O. Box 6
Igo, Calif. 96047

RMR:fer

ERNEST R. ROUSE & ASSOCIATES

REAL ESTATE APPRAISALS
FORESTRY SERVICES

1400 COURT STREET
REDDING, CALIFORNIA 96001
OFFICE (916-246-9656



November 10, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Sir:

The Rainbow Lake water system is extremely important to the communities of Igo and Ono. This dam and lake provide needed water for both communities. Tearing out the dam will cause extreme hardship on the communities and cause property values to decrease. In addition to the human needs for water out of the ditch system, many wildlife habitat areas depend on the water. The water system is also important for fire protection in the area.

Another extremely important side affect of removing the dam will be what to do with thousands of tons of decomposed granite sand which have collected behind the dam in the last 80+ years. This granite sand has collected over the years due to natural erosion. It was accelerated by poor logging practices in the late 40's and early 50's. I am very familiar with the area behind Rainbow Lake, having hunted there for a number of years. The area behind the lake is still unstable and continues to have erosion problems.

The State will have to address this problem if the dam is removed because the sand will clog the Cottonwood Creek fishery and possibly the Sacramento River. Presently we are experiencing a continued decline in the winter salmon run. Removing the dam will possibly destroy additional salmon spawning areas and other fisheries.

The State of California and the federal government is spending millions of dollars to protect the Trinity River fishery by putting in the Buckhorn Summit Catch Basin Reservoir to protect Grass Valley Creek and the Trinity River from siltation.

Wayne Gentry
Department of Water Resources
November 10, 1989

State and federal money will be needed to put in a new reservoir in the Rainbow Lake area if an environmental disaster is to be avoided. The water needs of the communities of Igo and Ono can be met and major erosion problems can be prevented by a new state and federally funded reservoir.

There will also be a need for grants and loans for an efficient pipe system to serve the communities. Our communities are not considered affluent and we cannot solve this problem without your help. Any help you can provide would be most appreciated.

Sincerely,

Ernest R. Rouse

ERNEST R. ROUSE
Real Estate Appraiser
Registered Professional Forester #1528

Mary V. Rouse
P. O. Box 95
Igo, California 96047
November 10, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Sir:

I was raised on the family ranch in Igo. I lived out of the area for several years, but moved back to Igo in 1968. We are dependent upon a well for domestic and irrigation water. I feel the irrigation water from Rainbow Lake has an effect upon how much water there is available in my well. If there were no irrigation water available from Rainbow Lake the wells of my neighbors would also be affected. Something must be done to save the Igo-Ono water system.

I know this is not an easy problem to solve, and that great care must be taken to find a solution to the immediate problem as well as provide water for future residents of the area. The people in Igo and Ono do not have the resources necessary to pay for the costs involved in such a project. Anything you can do to help us find funding to solve the problem will be greatly appreciated.

Sincerely,

Mary V. Rouse

MARY V. ROUSE

Nov 8, 1989
Oro, Ca.

Gerald Boles
State of California
Dept of Water Resources
Red Bluff, Ca.

Dear Sir:

Please consider the effects of closing Messerbeck Dam. It supplies water for many people and I'm sure you have been advised as to how many. Ranchers in this area are entirely dependent on this water supply. It is also used for domestic use, the water being used to keep many wells going as we have in a very dry area.

We are also susceptible to summer fires. Also the volunteer fire dept. depends on this water supply.

Wildlife also depends on the dam, as springs have been drying during the drought years.

These are only a few of the many benefits it supplies this area.

Property values will also fall sharply.

The dam is a necessity here so please help us try to save it, and we will cooperate to the fullest extent.

Thank you for your attention,

Very Truly Yours,
Mr & Mrs Ron Shelton
Orno, Ca
Platina Road
Orn 96072

November 14, 1989

**APPENDIX D**

Dept. of Water Resources
2440 Main Street
P.O. Box 607
Red Bluff, CA 96080

Dear Mr. Gentry,

I am writing in regards to the possible closure of Missleback Dam.

I have recently purchased 22 acres of land on Zogg Mine Road which I had planned to irrigate with water from the canal. In that I'm up hill from the ditch, my well only produces 2 - 3 gallons a minute. Enough for domestic use I'm told, but certainly not enough for irrigation.

My concern for the loss of this water goes beyond my being a future user of it though. I am currently Vice-Chair of the Shasta Group/Sierra Club and on the Borad of Directors for the Sacramento River Preservation Trust. My interest in habitat preservation for wildlife is something I take seriously. The raparian area that is sustained by the seepage from the ditch is one of the most profuse sanctuaries for wildlife in Shasta County.

I do realize the liability that exists and the responsibility the state and its agencies have for insuring public safety. Therefore, I would like to ask for your assistance in providing any suggestions as to what I might do as a concerned citizen to prevent the closing of Rainbow Lake.

Thank you.

Sincerely,

Ken Stockton
4762 Kings Way
Redding, CA 96003

*Carole Vossen*
*South Fork Irises*
*P.O. Box 7*
*South Fork & Archer Road*
*Igo, CA 96047*

November 14, 1989

Wayne Gentry
Department of Water Resources
2440 Main Street
Post Office Box 607
Red Bluff, CA 96080

Dear Mr. Gentry:

The following comments are made in response to the action taken by the Department of Safety of Dams to revoke the Certificate of Approval for Misselbeck Dam and Reservoir.

When I was a child I spent almost every weekend and the entire summer with my grandparents on their ranch of approximately 200 acres on South Fork Road west of Igo. They were both born in the area in the late 1800s and had settled there when they were first married; other members of their family and descendants have continued to live on surrounding ranches. My grandfather had a large number of cattle and I often rode horseback with him to the various pastures to check on them and to give them salt. I even learned to swim in the "Big Ditch", my bathing suit being the empty salt sack tied under my arms with two holes cut in the bottom.

My fond memories never left me so it was only natural when I married my husband Jerry, who I had met while living in Sacramento, and since my grandparents had passed on, that we thought of their home place as the perfect setting to live and raise our family. We have resided here for twenty-three years and hope to live out our lives here. Life hasn't changed much in this part of Shasta County; the setting is still very tranquil.

Over the years we have made a large number of improvements to the original home, have built a small reservoir to store water and have put in over a mile and one-quarter of sunken 6" pipe, at a considerable expense, to convey water from Hulen Creek, and during the summer months from the same ditch which I remember as a child, bringing water from Rainbow Lake. Before

putting in the pipe we relied on an open ditch between our property and the water source. Through our pipe we serve water to three households, irrigate fifteen acres by a pumped underground sprinkling system, as well as provide water to other pastures where we have cattle; ultimately that water benefits other ponds and residents below us. Our reservoir is also available at all times to the local volunteer fire department as a source of replenishing water for their trucks in the event of fire. Our domestic water comes from a 20-foot hand dug well which years ago supplied water for students at the nearby South Fork School. In addition, several years ago I became involved in the raising of irises for commercial distribution. Needless to say, water is an essential element in such an operation.

No hunting is allowed on our property so it has become a haven for many animals, birds, and waterfowl, including more than twenty Canadian geese which we feed, some of which raise their young here.

It is hard to imagine the total effect on the area and its residents, both human and animals, without the benefit of storage of water by Misselbeck Dam. While there are small streams fed by winter snow in a dry year it is very doubtful that by the end of summer there would be any water still flowing leaving the area vulnerable to wildfires and other hardships.

My husband and I have always been interested in the problems of this area, and most importantly, for us and the community, water, or the lack of it. He has served for twenty years as a non-paid director of the Igo-Ono Community Services District and of late has spent countless hours volunteering his time and energy to work toward a solution to the current water problems.

In conclusion, after thoroughly reading the draft EIR, it is my personal feeling that more attention should be given to the far-reaching and negative effect the revocation of the Certificate will have not only upon the quality of life of the residents of this area but the flora and fauna as well.

Thank you for allowing us to voice our concern.

Sincerely yours,

Carole Gentry

cc: Senator James Nielsen
Assemblyman Stan Statham
Congressman Wally Herger
Supervisor Bob Bosworth

November 14, 1989

Department of Water Resources
2440 Main St.
P.O. Box 607
Red Bluff, CA 96080

Dear Mr. Gentry;

I am writing in regard to the closing of Missleback Dam.

I have recently been looking at property off Zogg Mine Road for the purpose of building my future home. The parcels in which I'm interested, like much of the land in the Igo/Ono area, is dependent on the water that flows from Rainbow Lake.

I, like many Redding residents, enjoy visiting this area because of its beautiful scenery and abundant wildlife. In addition to the stifling of growth, the loss of wildlife habitat would also impact this area.

I realize your agency is working with the Community Services District on finding ways to prevent the closure of the dam. I would appreciate your informing me if there is anything further that I can do.

Thank you.

Sincerely,

Joanna H. Wilson

Ms. Joanna Wilson
105 Hilltop Dr. #105
Redding, CA 96003

cc: Senator Nielsen
Supervisor Bosworth
Assemblyman Statham
Congressman Herger

# APPENDIX E

## PERSONS, ORGANIZATIONS, OR PUBLIC AGENCIES COMMENTING ON THE DRAFT ENVIRONMENTAL IMPACT REPORT

APPENDIX E

The following persons, organizations, or public agencies provided comments on the Draft Environmental Impact Report:

| | | |
|---|---|---|
| Mary & Donald Belkin | P. O. Box 270 | Igo, CA 96047 |
| Michael J. Dinius | 842 Hartnell Ave. | Redding, CA 96002 |
| Aaron & Vivian Forschler | P. O. Box 8 | Igo, CA 96047 |
| Jeffrey L. Forschler | P. O. Box 4 | Igo, CA 96047 |
| Edgar H. & Patricia A. Grubb | 41 Comistas Court | Walnut Creek, CA 94598 |
| Glenn & Laura Haggard | P. O. Box 37 | Igo, CA 96047 |
| Jill K. Halvorsen | P. O. Box 33 | Igo, CA 96047 |
| Wally Herger, Congressman | 2400 Washington Ave. | Redding, CA 96001 |
| Dennis Houst | P. O. Box 81 | Igo, CA 96047 |
| Paula Humphrey | HCR1, Box 7010 | Igo, CA 96047 |
| Donald A. Kujath | P. O. Box 232 | Igo, CA 96047 |
| Dustin Madden | 1787 Marlene Ave. | Redding, CA 96002 |
| J. A. Mendenhall | 20665 Plymire Rd. | Red Bluff, CA 96080 |
| Charles Mosher | P. O. Box 8 | Igo, CA 96047 |
| Randy Mosher | P. O. Box 215 | Igo, CA 96047 |
| Jim Nielsen, State Senator | State Capitol, Rm 3063 | Sacramento, CA 95814 |
| Lars & Stephanie Pearson | P. O. Box 222 | Igo, CA 96047 |
| Marvin Peterson | Drawer A | Igo, CA 96047 |
| Dennis W. & Shirley M. Powers | HCR1, Box 3855 | Igo, CA 96047 |
| Mr. & Mrs. Gene Powers | P. O. Box 14 | Igo, CA 96047 |
| Mary Jan Powers | P. O. Box 42 | Igo, CA 96047 |
| Mary Jan Powers | P. O. Box 14 | Igo, CA 96047 |
| Robert M. Richter | P. O. Box 6 | Igo, CA 96047 |
| Ernest R. Rouse | 1423 Court Street | Redding, CA 96001 |
| Mary V. Rouse | P. O. Box 95 | Igo, CA 96047 |
| Jack Schreder | 1029 K Street, Suite 26 | Sacramento, CA 95814 |
| Mr. & Mrs. Ron Shelton | Platina Road | Ono, CA 96072 |
| Michael Spencer | P. O. Box 96 | Igo, CA 96047 |
| Ken Stockton | 4762 Kings Way | Redding, CA 96003 |
| Carole Vossen | P. O. Box 7 | Igo, CA 96047 |

| | | |
|---|---|---|
| Jerry Vossen | P. O. Box 1825 | Redding, CA 96099 |
| Joanna Wilson | 105 Hilltop Dr., #105 | Redding, CA 96003 |

# APPENDIX F

## LOAN AND GRANT PROGRAMS AVAILABLE TO ASSIST WITH WATER SUPPLY ISSUES

A variety of grant and loan programs are available to assist with financing the rehabilitation of Misselbeck Dam or development of alternate water supplies for the Igo-Ono Community Services District.

**State Programs**

Grant and loan programs available through the State of California provide low interest loans and grants for development of new water systems and upgrading of existing systems to meet drinking water standards. While funding has been expended in some of these programs, pending legislation would authorize additional bond measures to continue these programs.

Davis-Grunsky Act - Passed by voters in 1960, this act authorizes bonds for $130,000,000 to fund construction of local water supply and dam rehabilitation projects, and loans for drought emergencies. Grants are allowed under the act for up to $400,000, while loans with a repayment period of up to 50 years at 2.5 percent interest are allowed for up to $4,000,000. This program has funded 116 construction loans, drought emergency loans, feasibility report loans, and water-associated recreation grants. The remaining $3,000,000 in the program is expected to be used for the proposed Littlerock Creek Irrigation District dam repair project. Unexpended funds of about $500,000 from the Big Bear Municipal Water District grant may be available for other projects. Pending legislation (Assembly Bill 1571) would continue similar activities. Technical contact is Dan Otis, telephone number (916) 327-1657, in the Division of Local Assistance of the Department of Water Resources.

Safe Drinking Water Bond Law - This program was passed by voters in 1976 (Proposition 3), 1984 (Proposition 28), 1986 (Proposition 55), and 1988 (Proposition 81). Loans up to $5,000,000 and grants up to $400,000 are allowed to bring domestic water systems up to drinking water standards. Investigation loans and grants up to $25,000 are also available. Loan repayment may take up to 50 years at one-half the interest rate incurred by the State in the sale of the general obligation bonds. The current interest rate incurred by the State is 6.4 percent. The total bond amounts were $175,000,000 in 1976, $75,000,000 in 1984, $100,000,000 in 1986, and $75,000,000 in

1988. Unallocated funds total $10,800,000 from 1976, $13,500,000 from 1984, $80,200,000 from 1986, and $75,000,000 from 1988.

The Igo-Ono Community Services District received a $25,000 grant from this program in 1989 to investigate drinking water alternatives for the community of Ono. The district is also on the priority list for funding of construction activities related to improving the domestic water system. Funds from this bond program cannot be used for investigations or rehabilitation of Misselbeck Dam.

The program is administered jointly by the Department of Water Resources and Department of Health Services. Technical contacts are Barbara Cross ((916) 322-1571) in Bond Financing and Administration of the Department of Water Resources, or Richard Coddington or Dan Corrigan ((916) 323-6111) in the Public Water Supply Branch of the Department of Health Services.

Water Conservation Account, Clean Water Bond Law - Passed as Proposition 25 in 1984, $10,000,000 were made available for loans to fund water conservation projects. Water conservation projects would include such activities as lining of distribution canals to reduce water loss. Applications were received for 78 projects with requested funding totalling $96,000,000. Six projects were funded which exhausted the available funds. Pending legislation (Assembly Bill 1375) would continue funding for the program.

Water Conservation and Water Quality Bond Law - Passage of this law in 1986 as Proposition 44 provided $75,000,000 in loans to fund water conservation (such as distrubution canal rehabilitation) and ground water recharge projects. Applications were received for 65 water conservation projects and 38 ground water recharge projects. About 30 water conservation and 12 ground water recharge projects will be funded from the established priority list using the full amount of funding. Pending legislation (Assembly Bill 1375) would continue funding for the program.

Water Conservation Bond Law - Enacted following passage of Proposition 82 in 1988, $60,000,000 in loans were made available for water conservation, ground water

recharge, and new local water supply projects. Water conservation and ground water recharge projects have been allocated $40,000,000 with up to 20 years to repay loans at half the State's general obligation bond interest rate. The remaining $20,000,000 is available for new local water supplies with up to 20 years to repay at the State's general obligation bond interest rate. Loans up to $5,000,000 per project will be available for the construction of dams, reservoirs, or other improvements for the diversion, storage, or primary distribution of water, or facilities for ground water extraction, primarily for domestic, municipal, agricultural, industrial, recreation, fish and wildlife enhancement, flood control, or power production purposes. Program regulations and procedures are being developed, with applications expected to be processed in July 1990. Technical contact for the program is Dan Otis ((916) 327-1657) in the Division of Local Assistance of the Department of Water Resources.

Pending Legislation - Several bills introduced in the Legislature would add additional funding opportunities. Following Legislature and Governor approval, these bills would be put to public vote.

Assembly Bill 1375 - Introduced by Assemblyman James Costa, this bill would authorize the issuance of $100,000,000 in bonds to continue the water conservation and ground water recharge programs previously funded under Propositions 25, 44, and 82. The bill also would authorize issuance of $100,000,000 in bonds to finance a ground water treatment program. The interest rate for loans under this bill would be half the State's general obligation bond rate.

Assembly Bills 1571 and 1572 - Introduced by Assemblyman Norman Waters, these bills would authorize the issuance of $500,000,000 in bonds to finance local water supply projects. AB 1571 sets up the program provisions, which are similar to the Davis-Grunsky Act and portions of Proposition 82, while AB 1572 is the bond issue. Funding from the bill would primarily be as loans, with grants authorized only for recreational and wildlife enhancement portions of a project. The maximum project loan would be $10,000,000, with up to a 20 year repayment period at the State's general obligation bond rate.

Assembly Bill 2527 - This bill, introduced by Assemblyman Jack O'Connell, would authorize the issuance of $200,000,000 in bonds to continue financing the Safe Drinking Water Bond Law.

Senate Bill 2321 - Senator Jim Nielsen's bill would authorize the Department of Water Resources to make loans or grants to the Igo-Ono Community Services District to assist with evaluation and repair of Misselbeck Dam.

**Federal Programs**

The federal government also offers loan and grant programs to assist rural areas experiencing water supply problems. Two programs funded through the Farmers Home Administration and Department of Housing and Community Development are particularly suited to assist the Igo-Ono Community Services District. Approval of pending legislation will offer additional avenues of assistance.

Farmers Home Administration

The Farmers Home Administration (FmHA) provides both loans and grants to small communities unable to finance water systems through conventional sources, such as due to an inability to repay. The median household annual income for grants under this program must be less than $14,904. Pre-applications are accepted anytime. Keith Johnson (Farmers Home Administration, 2 John Sutter Square, Red Bluff; (916) 529-1540)) is the local contact for this program.

Department of Housing and Community Development

The Department of Housing and Community Development (HCD) operates the Small Cities Community Development Block Grant Program (CDBG), Rural Community Technical Assistance Program (RTAP), and Rural Development Assistance Program (RDAP). The CDBG contracts with local districts for construction or rehabilitation of community facilities of small cities and counties. The next funding cycle will begin in the spring. The local contact is William Ware

((916) 225-5160) of the Shasta County Housing Authority. The RTAP and RDAP programs are similar, but designed for rural areas. Further information about these programs may be obtained from the Department of Housing and Community Development at 1834 Mangrove Avenue, Suite B, Chico, CA 95926 ((916) 891-6870).

Pending Legislation

Pending legislation in Congress would establish revolving federal loan and grant programs to assist rural areas and small systems in securing adequate supplies of safe drinking water

Rural Partnership Act - The Rural Partnership Act of 1989 (S. 1036) would establish grants to be used for extending or improving water lines, equipment repair or replacement, maintenance, new wells, and other needs related to water treatment, storage, or distribution and compliance with federal drinking water regulations. The bill would also encourage Farm Credit System banks to make loans or extend technical and financial assistance for water supply improvements.

Rural Water Supply Assistance Act - The Rural Water Supply Assistance Act of 1989 (S. 1296) would allow the federal government to make capitalization grants to each state for use in establishing a rural water assistance revolving fund. The grants would apply to construction of rural water system improvements and are limited to systems serving less than 3,300 people.